

COMING OUT OF THE FOODSHED:  
CHANGE AND INNOVATION IN RURAL ALASKAN FOOD SYSTEMS

A  
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By

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See Appendix A for Information

## ABSTRACT

This thesis is a combined volume containing three individual research papers, each written for submission to a different peer-reviewed journal. Each to some extent investigates community resiliency and vulnerability as they manifest in the past and present of Alaska Native foodways. The first paper, ‘Outpost Gardening in Interior Alaska’ examines the historical dimensions of cropping by Athabascan peoples as a part of local food system development and innovation; the second introduces the ‘Services-oriented Architecture’ as a framework for describing ecosystem services, with the rural Alaskan model as an example; the third, from which the title of this thesis was taken, presents the process and outcomes of contemporary food system change for the Athabascan village of Minto, AK, as they “come out of their foodshed”. The three of these papers together introduce a language and a set of frameworks for considering local food systems within a context of development and global change that are applicable throughout Alaska and indeed to cases world-wide.

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## INTRODUCTION

Our lives are embedded within food. In ecological terms, food plays a structuring role in every living organism's niche and, when abundance of or competition for that food changes, behavioral changes must follow. The eater is also inevitably the eaten, a pattern which repeats ad infinitum through a "web woven endlessly" (Quinn 2005), and even minute changes or disturbances at one place in this web can initiate cascades that result in significant short- and long-term biological outcomes, from character displacement to speciation, extinction, even complete ecological regime change (Chapin III and others 2002). We too are intimately connected to this web, the ConAgras and Monsantos of the world notwithstanding. Indeed humans might very well be the species most connected to its food, for in addition to our biophysical needs we relate to food emotionally, socially and culturally: food can be an object of ritual, trade, tradition, solidarity, love and eroticism. So it is no surprise that when the foods in our lives change, aspects of our lives change with them.

That food systems change is an ecological as well as a social certainty, and for humans many of these changes can be completely under our direction. Indeed the constant alteration, adaptation and transformation of dietary patterns, e.g. the integration of new types of food, food processing and preparation methods, is an important aspect of human adaptation (Nabhan 2004; Reed 1995; Sahllins 1972). Like every creature we have to wrangel with the realities of food scarcity and compete for our food to the best of our ability, but we develop our competitive advantage beyond the mechanisms of our

biological adaptation to control when, how and how much we eat. We enact traditions that transmit and preserve our food knowledge, we create technologies for taking control over the consistency and safety of our food harvest and supply, and we observe social rules and institutions that govern the distribution of those foods to consumers (Nabhan 1990; 1998; Quinn 1991). These are our foodways, and embedded within them is a dynamic relationship with nature, society and economics, one where the preferences/choices we enact in order to fulfill our biophysical needs (like shelter and nutrition) and psychological/cultural needs (like ego, sense of place and belonging, appetite) transforms both us and our environment through the construction of meaning and assignment of cultural significance (Bennett 1976; Martin 2004).

Given that food and culture are so intertwined, it is reasonable to expect that when new forces come to bear on our ability to manage and respond to changes to our food systems, outcomes can follow that inflict upon us and our communities a significant amount of physical and psychological stress. When the act of eating is no longer a matter of individual choice, local production, or adaptation, but restricted by outside forces such as changes in weather and ecosystems, market economics and/or institutional restrictions or prohibitions, we are left vulnerable (Etkin 1994; Gerlach and others in press; Glantz 2006; Grivetti and Ogle 2000). There remains, however, a deficit of knowledge regarding the tangible linkages between these changes to local food systems and the contemporary vulnerabilities and syndromes that challenge the cultural and physical well-being and integrity of people and their communities world-wide. Knowing to what extent these linkages are real or perceived is essential if anyone is to successfully pursue and

contribute to the discovery of the causes of and solutions to epidemics such as malnutrition, obesity, diabetes, cancer, depression and alcoholism and drug abuse.

Indeed as we continue to become aware of the caveats and negative implications of the global industrial food system and its highly-processed foods, e.g. obesity, diabetes and the slow, sorrowful demise of rural America, we also contribute to our understanding of the possibilities and benefits inherent in local food systems. Strong local food systems make for strong and healthy communities and ecosystems; the work presented here was done foremost to contribute, in this respect, to the importance of indigenous slow food movements everywhere. From the experimental village garden in Noatak or Calypso Farm and Ecology center in Ester, Alaska to Broadturn Farm in Scarborough, ME, these are grass-roots, community-based movements where people are taking control over the foods they eat one meal at a time, in a manner that is most meaningful and appropriate to themselves, their families and their community. They range in scale from the largest community supported agriculture programs (CSA), to the smallest group of families that have chosen to share in weekly potlucks in hopes of rebuilding a community of social, economic and spiritual support around them.

The Athabascan peoples of interior Alaska are similarly engaged in such movements, to resist the further incorporation of the global food system into their communities, and to find new, innovative ways to build healthy and resilient local food systems. It is clear from ethnographic and scientific sources that in the past 100 years the diets of Alaska Native peoples have changed dramatically, and it is equally as clear that these communities are grappling with many of the syndromes listed above (AMAP 2003;

ATSDR 2001; Graves 2003; Kuhnlein and others 2004; Nobmann and others 1992; Reed 1995; Schneider 1976). While the majority of foods consumed by Alaska Natives were once country foods (i.e. wild fish, game, waterfowl and upland birds, plants), and the harvest of these resources continues to represent the best nutritional strategy, it is no longer the most consistent or secure food source because of changing social, ecological, economic and political conditions that are very much outside of local control. This research investigates both the past and present of food systems change and innovation in these communities, with the hopes of contributing through collaboration and through social and ecological research to the capacity of local communities to strengthen their self-reliance. Too, it is hoped that the rural Alaskan examples presented here might offer some lessons regarding the dynamics of these linkages between food systems change and physical, psychological and cultural well-being, lessons that are relevant to local communities world wide.

### *Chapter Overview*

Each of the three chapters in this thesis investigates the dimensions of resiliency and vulnerability as they manifest in the past and present of rural Alaskan food systems. The first, “Outpost Gardening in Interior Alaska,” examines the resiliency of Athabascan foodways from a historical perspective. Alongside hunting and gathering, gardens have for over a century played an important role within the customary and traditional foodways of Native Alaskans. Nevertheless, a question of ‘nativeness’ pervades the dialogue regarding contemporary village gardening initiatives in rural Alaska, both from

within and without native communities. The chapter makes use of some recently identified archives to explore the history of gardening practices in the Yukon Flats region of Alaska, its legitimacy in respect to “tradition” as a state-legislative and regulatory context, and the origin of (mis)conceptions regarding its role in household and community economies. By scrutinizing a roughly 20-year history of garden crop records and synthesizing them with interviews and existing ethnographic sources, this chapter argues that gardening has and continues to fulfill a role in Athabascan foodways that is perhaps best characterized as ‘outpost gardening’ (after Francis 1967), where agriculture was not valued as a primary or ideal means of subsistence, but as one component of a flexible and diversified cultural system.

The second chapter introduces a new framework for extending the ecosystem services concept popularized by the Millennium Ecosystem Assessment (2004). Called the ‘Services-Oriented Architecture’ (SOA) it is a meta-data model popular in the information technology (IT) industry, through which businesses manage information about the services they offer to their customers, how and where these services are provided, and the policies that govern their use. Chapter 2 presents a modified version of the SOA as a simple, scalable data framework for describing ecosystem services. In this chapter I lay out the prototype of the SOA as a way to further the usefulness of the ecosystem services framework and demonstrate it using an example from rural Alaska. This chapter offers a set of common vocabulary and definitions that social science and biological science researchers should both be able to leverage in order to capture and organize all relevant information about ecosystem services. It establishes a standard for

deconstructing and analyzing ecosystem services, viewing how they have changed or might change over time, and for evaluating and modeling service substitutability.

The third and final chapter explores the contemporary foodways of one particular Alaska Native community, that of Minto. I discuss the harvest of traditional foods, but expand beyond subsistence to discuss the whole rural Alaskan food system and Minto's place within it, and then scale back down to the community to look at some of the ways in which food, nutrition, and community health are linked through ecology, economic and political institutions to produce outcomes where food (calories) may be secure but nutrition is certainly not. Minto remains an excellent example of the "commensal" community, where people live and eat together in a manner that is respectful of each other, of the land and the environment, and built upon a moral economy where food is considered more than a commodity to be exchanged through a set of impersonal market relationships and held as central to community well being. Yet Minto's food system is fragmenting, and its people, like so many Alaska Native communities, are faced with contemporary syndromes such as diabetes, obesity, heart disease, depression and alcoholism. To get at the dynamics and outcomes of these circumstances I use Kloppenburg et al's (1996) foodshed metaphor to show how Minto is "coming out" of their foodshed: a process where a variety of exogenous circumstances are causing country foods (those harvested from the land, often called subsistence foods) to be increasingly supplanted by store-bought foods. The metaphor allows us to explore the details of how this transition provides these communities an additional measure of food security but also

increases their vulnerability to external economies and politics, and undermines their overall measure of self-reliance.

## REFERENCES

- AMAP. 2003. Amap Assessment 2002: Human Health in the Arctic. Oslo, Norway: Arctic Monitoring and Assessment Programme (AMAP).
- ATSDR. 2001. Alaska Traditional Diet Project. [online] URL: <http://www.atsdr.cdc.gov/alaska/>.
- Bennett JW. 1976. The Ecological Transition: Cultural Anthropology and Human Adaptation. New York: Pergamon.
- Chapin III FS, Matson PA, Mooney HA. 2002. Principles of Terrestrial Ecosystem Ecology. New York: Springer.
- Etkin NL, editor. 1994. Eating on the Wild Side. Tuscon: The University of Arizona Press.
- Francis KE. 1967. Outpost Agriculture: The Case of Alaska. Geographical Review LVII(4):496-505.
- Gerlach SC, Turner AM, Henry L, Loring P, Fleener C. in press. Regional Foods, Food Systems, Security and Risk in Rural Alaska. In: Duffy LK, Erickson, editors. Circumpolar Environmental Science: Current Issues in Resources, Health and Policy. Fairbanks: University of Alaska Press.
- Glantz MH. 2006. Prototype Training Workshop for Educators on the Effects of Climate Change on Seasonality and Environmental Hazards. Final Report Submitted to Apn, 2004-Cb07nsy-Glantz.: Asia-Pacific Network for Global Change Research.
- Graves K. 2003. Resilience and Adaptation among Alaska Native Men. Fairbanks: University of Alaska Anchorage.
- Grivetti LE, Ogle BM. 2000. The Value of Traditional Foods in Meeting Macro- and Micronutrient Needs: The Wild Plant Connection. Nutrition Research Reviews 13:1-16.
- Kloppenborg J, Hendrickson J, Stevenson GW. 1996. Coming into the Foodshed. Agriculture and Human Values 13(3):33-42.

- Kuhnlein HV, Receveur O, Soueida R, Egeland GM. 2004. Arctic Indigenous Peoples Experience the Nutrition Transition with Changing Dietary Patterns and Obesity. *Journal of Nutrition* 134(6):1447-1453.
- Martin GJ. 2004. *Ethnobotany: A Methods Manual*. London, UK: Earthscan Publications Limited.
- Nabhan GP. 1990. *Gathering the Desert*. Tuscon: University of Arizona Press.
1998. *Cultures of Habitat: On Nature, Culture and Story*. New York: Counterpoint Press.
2004. *Why Some Like It Hot: Food, Genes and Cultural Diversity*. Washington, D.C.: Island Press.
- Nobmann E, Byers T, Lanier AP, Hankin JH, Jackson MY. 1992. The Diet of Alaska Native Adults: 1987-1988. *American Journal of Clinical Nutrition* 55(5):1024-1032.
- Quinn D. 1991. *Ishmael*. New York: Bantam.
2005. *Tales of Adam*. Hanover, NH: Steerforth Press.
- Reed LJ. 1995. Diet and Subsistence in Transition: Traditional and Western Practices in an Alaskan Athapaskan Village: University of Oregon. 265 p.
- Sahlins M. 1972. *Stone Age Economics*. Chicago, IL: Aldine Atherton Inc.
- Schneider WS. 1976. *Beaver, Alaska: The Story of a Multi-Ethnic Community*. Ann Arbor: Bryn Mawr College.

## CHAPTER 1

### **Outpost Gardening in Interior Alaska: Historical Dimensions of Food System Innovation and the Alaska Native Gardens of the 1930s-70s.<sup>1</sup>**

#### **1.1 ABSTRACT**

“Subsistence activities,” i.e. the harvests of wild fish and game as practiced by Alaska Natives, are regulated in Alaska by a legal framework that defines what is and is not “customary and traditional.” For over a century, various forms of crop cultivation, e.g. family, community, and school gardens have played a role within the foodways of many Alaska Native groups. Nevertheless, these activities are not widely considered to be either customary or traditional, an oversight with consequences for communities that are experimenting with new community garden initiatives, as well as for any Native community who pursues innovative responses to the new challenges brought to bear by forces such as global climate change. This paper makes use of some recently identified archival and documentary sources to illuminate the underrepresented history of cropping practices by Native communities in the Tanana and Yukon Flats regions of Alaska. Indeed as it is presented here, crop cultivation meets the criteria of a customary and traditional practice as defined by state and federal law: cropping has and continues to fulfill a niche within several communities’ foodways best characterized as “outpost

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<sup>1</sup> Loring, P.A. and S.C. Gerlach. in Preparation. Outpost Gardening in Interior Alaska: Historical dimensions of food system innovation and the Alaska Native Gardens of the 1930s-70s. *Agricultural History*.

gardening” (after Francis 1967), valued not as a primary means of subsistence, but as one component of a flexible and diversified foodshed.

## **1.2 INTRODUCTION**

The University of Alaska’s Cooperative Extension Service (CES) is presently aware of a great number of Alaska towns and villages, From Kotzebue to Ketchikan currently experimenting with some form of small-scale agriculture – be it community garden, greenhouse, 4-H or other school garden, timber harvest or wild berry stand cultivation (Hebert 2006; CES 2006). Though the thought of gardens in the arctic and sub-arctic may stretch the imagination for many not familiar with Alaska, and might be read as culture change when attributed to characteristically hunter/gatherer societies, Alaska Natives have in fact a rich and in some cases very successful history of leveraging crop cultivation as an adaptive strategy. When combined with the many university-run agricultural experiment stations and other urban gardening and farming initiatives, Alaska proves to be a proverbial “hot bed” of activity toward the development of new sustainable agriculture technologies for high latitudes. These new, innovative rural initiatives are emerging in response to an increasing problem of food and nutritional security, driven (in general) by exogenous economic, political and ecological changes such as the downscale, synergistic effects of global climate change and industrial development, with circumstances that differ widely from community to community (i.e. Eskimo, Athabaskan, Aleut; coastal, inland, and island, etc.) but share a common set of themes (Duhaime 2002; Gerlach et al. in press; Kruse et al. 2004). Such new strategies

are proving to be out of step, however, with state and federal regulatory frameworks that govern (and to some extent protect) the uses of and access to land and wildlife resources by Alaska Natives for “subsistence” purposes, frameworks which tend to freeze Native activities temporally within a paradigm of documented and recognized “customary and traditional” behavior. These two words are powerful preconditions for the legitimacy of protected resource use by Alaska Natives that pose real ramifications for the ability of these people to continue to live and adapt on the land in the manner they see fit (Gerlach et al. in press).

This paper presents data from archived materials of the US Bureau of Indian Affairs (BIA), Alaska Native Service (ANS), and the CES, along with existing ethnographic and oral history sources to show that these new crop cultivation practices meet state and federal criteria for both “customary” and “traditional” status. In particular, this paper focuses on records of the Athabascan Indian communities in the interior “flats” regions of the Yukon and Tanana rivers (Figures 1.1, 1.2 and 1.3), though the broader implications of the arguments made here extend to Native communities statewide. Though the gardens that these records document never quite lived up to the narrative of economic development pursued by the BIA, they were nevertheless successfully used by Alaska Natives to fill an important role in local foodways, contributing an additional measure of economic diversity and therefore resilience to these communities. Francis (1967) termed this strategy “outpost agriculture:” not compatible with open markets, nor driven by the notion of economic development, but high in utility and flexibly and customized to serve local, often changing needs. This paper will tell the story of this

practice within these Interior Alaskan communities of Arctic Village, Beaver, Canyon Village, Chalkyitsik, Circle, Fort Yukon, Minto, Rampart and Stevens Village, and will show that embedded in the strategy of outpost agriculture, as one part of many in a complex and adaptive cultural, economic and subsistence system, is evidence that *flexibility* and *diversity* are perhaps the most appropriate benchmarks of what is truly “customary and traditional.”

### 1.3 SUBSISTENCE: THE LEGISLATIVE GEOGRAPHY OF ALASKA NATIVES

*Subsistence is a word. You know, a word you use to describe a way of life, our life. Though it doesn't do a very good job. We used to live off the land but now we live off of subsistence. Do you know what I mean? I mean we used to live on our luck<sup>2</sup>, what the land gave us. But now we supposed to live on what the subsistence rules says we can have. Supposed to be better that way. We just want to be left alone.* Anonymous Alaska Native speaker at the 2007 Alaska Forum on the Environment

It is important to understand *why* a discussion of crop cultivation as a customary and traditional practice is important to Alaska Native communities, and this requires a review of the unique legal context within which these communities' subsistence activities are regulated. According to the current State of Alaska resource management regime, the country food harvest by Alaska Natives is defined in law as the “customary and

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<sup>2</sup> The Athabascan concept of ‘luck’ is complicated, and has to do with how success in living on the land comes best to those who ‘receive’ what the land has to offer, rather than to constantly ‘wish’ for the things they believe they need. This is related to the taboo *enje*, which warns against the speaking of / predicting future events (Krupa 1999).

traditional use of wild, renewable, fish and wildlife resources for food and other non-commercial purposes” (Alaska Statute 16.05.940(33)). Though this does provide a measure of protection, it comes with some troubling ramifications. As the Native gentleman is alluding to in the quote above, local foodways that once functioned in a highly flexible manner, mediated by complex ecological relationships between people, and between people and the landscape, are now also mediated by the regulatory frameworks and interpretations of state and federal resource management agencies that this law (and others like it) espouses (Huntington 1992). To put it another way, foodways become “locked in” to a traditional and customary temporal paradigm, the definition of which is outside local control (Allison and Hobbs 2004).

The timeline for what is and is not customary and traditional is often centered at 1971<sup>3</sup> – the year of the passage of the Alaska Native Claims Settlement Act (ANCSA), which created thirteen regional and local Native corporations with an economic and entitlement approach that differed significantly from the reservation and tribal model of the lower 48 states and parts of Canada. Through ANCSA, Alaska Natives received land and money as part of a land exchange to be divided among the state and federal government; these corporations were paid \$962.5 million, and allowed to select forty-four million acres of land (Alaska is roughly 375 million acres in size) as compensation for the “extinguishment of their aboriginal title” (Case 1984; Mitchell 2003). ANCSA failed to take formal action on rights protecting the access to and use for subsistence

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<sup>3</sup> For example, the first chapter in *Alaska Subsistence: A National Park Service Management History* by Norris (2002) is titled “Alaska Native and Rural Lifeways Prior to 1971,” as if everything changed in terms of local “lifeways” with the passage of ANCSA.

purposes of the lands forfeited in the deal, however. This omission led the U.S. Congress to pass the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, attempting to return some level of subsistence rights to Alaska Native people, establishing the eligibility for subsistence priority in resource management decisions with three criteria: “(1) customary and direct dependence upon the populations as the mainstay of livelihood; (2) local residency; and (3) the availability of alternative resources” (ANILCA, PL96-847 S804). Further, ANILCA defines subsistence use as:

Customary and traditional uses by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non edible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade. (ANILCA, PL 96-847 S803)

The country food harvest has been temporally fixed by this sort of language, extracted from the remainder of local life ways and placed into an artificial category that is reified by law and by the perceived need for ‘resource’ management. Alaskan Natives did not in the past divide their daily activities along lines that are clearly defined as modern or traditional, “for subsistence” or otherwise; they simply did what was necessary to make a living for themselves and their families, working on landscapes in and around their local communities. Today Native Alaskans do use the phrase, to describe some tangible thing outside of their community that needed to be protected; one community member told me that he supported my research because “they need to support anything that will be good

for subsistence.” Many also project the category upon everything they consider traditional and “worth saving” about their community’s way of life, as ‘subsistence’ is perceived by many to be their most viable legal venue for asserting cultural legitimacy and authority (Huntington 1992; Case 1984). In practice, however, this has the danger of further reducing/restricting their cultural heritage within exogenous definitions that are in fact largely out of their control.

### *1.3.1 Customary, Traditional*

For historically-mobile indigenous communities like the Athabascans of Interior Alaska, it is the patterns of land use that are considered most traditional, more so than the specific harvest technologies and even the particular harvested animals (Nelson 1986; Pelto 1987; Kruse et al. 2004; Gerlach et al. in press). It is not the intent of this paper to embark on a discussion regarding the anthropological meanings of either “customary” or “traditional.” Regardless of such a debate, the research data presented here creates a clear pattern of and timeline for behavior and land use, with the intent of establishing a measure of legitimacy for Native gardens which other community-based initiatives, e.g. the restoration of Wood Bison in the Yukon Flats, have proven necessary when working within these state and federal subsistence frameworks (Stephenson et al. 2001; Sanderson et al. in press). This is a consideration acknowledged readily by the community members I have interviewed, who are both aware of and sensitive to these imposed definitions:

We’ve got to make a living, you know? But some people worry, that if we stop looking or acting like hunters and fishers we’ll lose what rights we have left on

this land. Using a motorboat, you know, out on the flats doesn't make us less traditional, but digging for potatoes when we could be fishing, to some people, does. If we ask the department of game for more moose tags or longer hunting seasons, or to hunt out of season, because we need to eat, they'll tell us to eat our potatoes. (Anonymous 2006)

To many people, gardening seems quite non-native – outside that regulated sphere of tradition. The 1998 review of 100 years of Agriculture in Alaska, published by the University of Alaska Fairbanks (UAF)'s School of Agriculture, for instance, makes no mention whatsoever of the long history of native subsistence gardening that I will present here. Nor is cropping mentioned in various subsistence reports from the Alaska Department of Fish & Game (ADF&G)<sup>4</sup> or in the National Park Services's 2002 historical review *Alaska Subsistence* (Norris 2002; Andrews 1988; Caulfield 1983; Sumida 1989). These omissions do the Native communities a great disservice, not just with respect to their history, but beyond the rights to hunt or to garden and deep into their ability to maintain self-reliance through local control over the food supply.

#### **1.4 SETTING: INTERIOR ALASKA, THE YUKON AND TANANA RIVER FLATS**

The rural Alaskan communities of the Yukon and Tanana river flats involved in this research are Arctic Village, Beaver, Canyon Village, Chalkyitsik, Circle, Fort

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<sup>4</sup> Sumida (1989) appears to be the only ADF&G community subsistence profile to include (a very short) note, under the heading "Plant Resources" (p. 66) about contemporary family gardens, though no mention is made of the role they played prior to 1989.

Yukon, Minto, Rampart and Stevens Village (Figure 1.3). Not only do these communities share a distinct geographic setting and historical context (Olson 1981), they also were dealt with together as an informal management unit by the BIA<sup>5</sup>. The setting of the communities spans from the Upper Yukon River Watershed, down through to the Lower Tanana River Watershed, a vast wetlands basin bounded roughly by the Yukon and Tanana rivers (Figures 1.1 and 1.2). The “flats” between these two major rivers is underlain by permafrost and includes a complex network of lakes, streams, and rivers. The area is characterized by mixed boreal forests with rolling hills, scattered meadows and bogs, and is dominated by spruce, birch, and aspen. The communities straddle both sides of the arctic circle, but the area has in general a continental subarctic climate with great seasonal extremes in temperature and daylight: summer temperatures can reach 100 degrees F, whereas winter temperatures can drop to -70 degrees F (USFWS 2006; AKDEC 2006).

Movement on and across this landscape is fundamental to the feasibility of Native Alaskan adaptive strategies, the patterns of which co-developed over millennia with the migratory patterns and population cycles of harvested animals. These communities are best known as fishers, game hunters and wild resource gatherers, with country foods such as salmon, whitefish, moose, caribou, beaver, ptarmigan and waterfowl, and botanical resources such as berries, wild rhubarb and rosehips, continuing to represent over 80% of

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<sup>5</sup> Herman Turner, Agricultural Agent-at-Large, University of Alaska Cooperative Extension (CES), letter to Mr. Vern V. Hirsch, Assistant Director of the Division of Resources, ANS, dated May 18, 1956; Mr Turner lists Fort Yukon, Circle, Venetie, Arctic Village, Beaver, Stevens Village and Minto, as the places visited on a tour of “Central Yukon.” Though not referenced in this letter, Rampart, Chalkyitsik and Canyon Village are also found grouped with these villages. File 916, Garden Subsistence(GS); General Subject Correspondence 1933-1963 (GSC); Alaska Reindeer Service (RR); Record Group (RG) 75; National Archives Pacific Alaska Region (NAPA)

local diets (Wolfe and Bosworth 1990; Norris 2002). Fall activities are dominated by the moose/caribou hunts, and most still travel to fish camps each summer: seasonally used fishing and trapping areas on the Tanana and Yukon rivers, as well as their tributaries/distributaries. Indeed harvested lands today remain remarkably similar to those utilities at the turn of the 20<sup>th</sup> century (Figures 1.4, 1.5). But today the logistics of travel across these harvest areas is complicated and brings external forces to bear on local adaptive capacity and food security. The seasonal mobility and flexibility that once typified Alaska Native adaptations no longer functions in the same way because people are now tied to permanent villages, and reliant on the purchase and maintenance of transportation technologies (i.e. ATVs and gasoline). Mobility is further constrained a patchwork of state, federal and private land ownership (Figure 1.6) and an institutional and regulatory framework that puts federal and state agencies in a position to legislate control over much of the landscape (Gerlach et al. in press; Juday et al. 1998; Krupnik and Jolly 2002; Nationalatlas.gov 2003). Within the last two or three years this has been further aggravated by ecological changes in weather and land cover. Particulars of these downscale impacts of global climate change in Alaska's interior are poorly understood, though the current and projected biophysical impacts of climate change are expected to be the most extreme in high latitudes (Overpeck et al. 2005). Hunters cite observations that match with the anticipated phenology of climate change: including the shifting of seasons, time of and time between freeze-up and break-up, lower water levels on the rivers, and new distributions/migration patterns of fish, game, plants and insects. Despite these perceived changes, however, appropriate compensatory changes have not been

made by Alaska Department of Fish and Game (ADF&G) or the U.S. Fish and Wildlife Service (USFWS) officials to the regulations surrounding hunting and fishing seasons (though a formal venue does exist to petition for hunting rights in special circumstances when food is particularly short). In combination with the fact that state regulations prohibit the assignment of a ‘rural’ preference for wildlife resources (over urban and tourist hunters), these regulatory frameworks do little in practice toward representing the changing needs of these communities (Gerlach et al. in press; Huntington 1992; Caulfield 2002).

## **1.5 BACKGROUND: A PERSPECTIVE ON ALASKA AND ALASKA NATIVES’ AGRICULTURAL HISTORY**

The first Russian settlers of Alaska (early-to-mid 1800s) are generally considered to be the first to try their hand at cropping in the territory (Hanscom 1998). They failed rather miserably at it, mostly because of a lack of agrarian tradition and an inability to enlist the support of a sizeable number of serfs, the only Russian people with a background in agriculture (Shortridge 1972). They did, however, manage to share the tradition of potato growing to the Native peoples of Southeast Alaska and the Pacific Northwest; indeed the Haida grew potatoes as an export crop for both the Russian American Company as well as the Hudson’s Bay Company (Ransom 1946; Shortridge 1972; Dean 1995). Some cropping was also practiced in Interior Alaska, introduced with the Canadians of the Hudson’s Bay Company’s establishment of Fort Yukon in 1847: the Athabascan people of the area began growing potatoes, vegetables, and even some cereal

grains for food and for trade (Shortridge 1972). While only fragments of documentation for this exists prior to 1941, mention of potatoes and some other root vegetables does appear from time to time in a variety of correspondence between BIA<sup>6</sup> agents and the office in Juneau. It seems that the native communities were growing crops whenever visitors offered seeds to trade, albeit in a fashion that would not have been recognized as ‘organized’ gardening, as per one Alaska Native Service (ANS) school teacher, who also mentions in an early (1937) report that “gardening prospects here are good, despite the poor land, as the Indians already have a taste for potatoes and turnips.”<sup>7</sup>

Alaska had, just prior to the turn of the 20<sup>th</sup> century, entered the realm of “new frontier” in the minds of those stateside, and a pioneer agriculture movement to populate Alaska with aspiring Euro-American farmers from the lower-48 emerged with ardor; it would eventually prove, however, to be nearly as much a failure as the Russian attempts had been (Shortridge 1972; Francis 1967). By the 1890s nearly all of the major areas of fertile, drought-free lands in the continental U.S. had been claimed, and it seemed that the only remaining option was Alaska (Shortridge 1972). With the 1902 declaration by the head of the US Department of Agriculture’s experiment station in Fairbanks, “it has been demonstrated that Alaska has agricultural possibilities of a high order,” the land rush was officially on (Georgeson 1902; Hanscom 1998). The migration seemed to make a strong start; by 1929 there were 500 farms reported to the US Census, none of which, however, established by Alaska Natives (ARDC 1974; Francis 1967). But as transportation into

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<sup>6</sup> At the time the Bureau of Indian Affairs was called the Office of Indian Affairs

<sup>7</sup> G.S. Wilson, ANS Schoolteacher, to Mr. Claude M. Hirst, General Superintendent, Office of Indian Affairs, Juneau, AK. 9/3/1937; File 916, GS; GSC; RR; RG75; NAPA

and through the state improved (i.e. with the building of rail lines) the cost of shipping came down and lightweight packaged goods like dry milk became cheaper, Alaskan agriculture, already plagued by the inherent difficulties cropping in the north, e.g. poor soils, unpredictable frosts, and a short growing season, was increasingly out-competed by imported foods (Francis 1967; CES 2001; Loring 2006). Upstart farms went defunct as quickly as they had been established, and there was soon a general understanding among bureaucrats that agriculture could only make up a small part of Alaska's long-term economic growth (Shortridge 1972).

To elaborate on the difficulties of cropping in the north, Interior Alaska poses a number of geographic and ecological challenges and constraints. The high latitude, for example, makes for an extremely short growing seasons (12-14 weeks at the most), and within that season there is relatively high-frequency of mid-summer and early fall frosts and/or freezes; similarly, the extreme cold temperatures during the winter also serves to kill all but the hardiest perennials (CES 2001; AKDEC 2006). In many villages the river water was also considered to be too cold for direct irrigation, requiring some sort of pump & reservoir infrastructure<sup>8</sup>. The prevalence of black spruce (*Picea mariana*) in the boreal ecosystem also creates its own set of challenges: the root structures are shallow and widespread, and in concert with the active forest fire regimes, creates extremely acidic soils (O'Neill et al. 2002; Wikipedia 2006; LeBarron 1945). Too, smoke from the high-frequency of forest fires collects within the basin of the Alaskan interior, and during

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<sup>8</sup> Whether real or perceived, the coldness of river water is mentioned often in BIA reports from schoolteachers as an obstacle.

heavy burn years can significantly limit sunlight (Wikipedia 2006; Rupp et al. 2002; Juday et al. 1998).

Nevertheless, agrarian idealism persisted in the state, particularly in respect to “white-man’s burden” for the education of Alaska Natives (Gerlach 1996; Hinckley 1966). In Northwest Alaska, also in the late 1800s, famine precipitated at least in part by a depletion of whale stocks by Yankee whalers prompted a plan by Presbyterian minister Sheldon Jackson to import Reindeer herding to the imperiled Eskimo communities as a mechanism of economic aid and industrial education (Gerlach 1996; Bockstoe 1986). The venture started what would evolve into an all-Alaska agricultural office of the BIA, coined the “Reindeer Service” (Archives 1975; Postell 1990). Village gardening projects also emerged under the jurisdiction of the Reindeer Service as similar mechanisms of economic development. It was generally believed, by BIA administrators, schoolteachers, missionaries, etc., that Alaska Natives had an apathy towards the “obvious comforts” of white people, and that the subsistence lifestyle was an irrational and unnecessary subservience to the nuances of nature, thought of as wrong, backwards, and reflective of a general lack of understanding the natives had toward their “situation” (Agatha 1965; Hinckley 1966; Postell 1990). Real social and economic security, or so these colonial minds believed, was to be had in cultivating the land and the development a cash economy. The BIA and University of Alaska (a USDA land grant institution) were both involved in aggressive rural development<sup>9</sup> throughout the first half of the 20<sup>th</sup> century,

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<sup>9</sup> Letter from Henry A Benson, Commissioner of the State Department of Labor, to Ernest N. Patty , President, University of Alaska, 8/27/1947, provides an excellent representation of this mindset: “For some time several Territorial agencies have been concerned with the lack of development of our rural areas...”

therefore, with programs such as the reindeer herding mentioned above, the Alaska Native Arts Clearinghouse (which tried to stimulate economic growth through the production and management of Native arts and crafts for export), and family and community gardens implemented and administered by the Alaska Native Service. Later, as the extension office of the University of Alaska expanded to serve more than just Alaska's Euro-American constituency<sup>10</sup>, the responsibility for village agricultural development became a shared one between ANS school teachers, the extension service and 4-H.

## 1.6 BIA RECORDS

The U.S. National Archives, Pacific Alaska Region Office holds a significant collection of records regarding these gardening practices, filed under 'Record Group 75: The Bureau of Indian Affairs, Alaska Reindeer Service'. Annual food and garden surveys were officially requested of ANS teachers by the BIA beginning in 1941; a circular letter sent from V.R. Farrell, Director of Education for the BIA to all ANS schoolteachers described the need for these inventories:

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he says, which "competent observers in every rural district" report as driven by (among a list of symptoms) the lack of skills, ignorance of the use of money, and nothing to do with their free time. File 916, GS;GSC;RR;RG75;NAPA.

<sup>10</sup> Letter from Allan H. Mick, Dean & Director of the U of A Cooperative Extension Service, to Glen Emmons, Indian Commissioner of the US Department of the Interior, dated 4/1/1954; Mr. Mick expressed his desire to expand the CES's jurisdiction to include Native communities, but not wanting to duplicate the work of the ANS. File 916, Garden Subsistence;GSC;RR;RG75;NAPA.

Shortly thereafter, on June 4, 1954, a U.S. Senate sub-committee hearing on Indian Affairs passed *U.S. Senate Bill 3385*, which transferred responsibility for village gardening initiatives from the BIA to the CES. Note however that ANS schoolteachers continued to be the facilitators and record-keepers for these initiatives in some communities as late as the 1970s.

It is important that we have a survey of the quantity of garden vegetables and other locally available foods produced and stored during the current season.

Garden seeds supplied by the Government should be regarded as educational supplies in the same sense as home economics, and shop supplies, and it is desirable that some measure be made of the extent to which they are utilized. ...

Too much emphasis cannot be placed on the desirability of having Native people collect and store maximum quantities of fish, berries, meat and other locally available food products.<sup>11</sup>

Each year, teachers were required to fill out surveys of “Native Food” and of “Garden Activity” (Figures 1.8 and 1.9)<sup>12</sup>. The native food reports provide detailed subsistence-food data for each of the villages in the flats, from five to as many as 25 years regarding the annual harvest of caribou, moose, berries, fish, waterfowl and small mammals, with detail about the pounds harvested, methods of storage, and quantities remaining after winter. The office was very diligent in its record keeping, and they were used, at least in part, to both anticipate and respond to food shortages. The garden surveys provide similarly extensive detail regarding each village’s gardening projects, including details regarding fertilizer used, method(s) of cultivation, and crop quantities and varieties planted and harvested. Schoolteachers also used these forms to make a wide range of commentary about the community, environment, even politics. One teacher in the village

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<sup>11</sup> V.E. Farrel, Director of Education, Office of Indian Affairs, Juneau, AK, to “Teachers”; File 917, Ag. Statistics & Production: Beaver 1933-66; Agricultural Hunting & Fishing Statistics: Afognak – Fort Yukon; RR; RG75; NAPA.

<sup>12</sup> File 917, Agricultural Hunting & Fishing Statistics: Afognak – Fort Yukon (AHF1), Kwinglillingok - Scammon Bay (AHF2), and Selawik-Yakutat (AHF3); RR; RG75; NAPA.

of Minto remarked in 1944 that the food supply for winter that year was “inadequate because too many boys entered the war for [the] big wages. Increase supply by stopping the war.”<sup>13</sup>

These documents represent the majority of the reference material used as the basis for this research. Table 1.1 contains some summary information for these records for each community, including population averages, range of garden production, and comments (made by me) where applicable. A more detailed transcription of these records is available on the CD found in the pocket of this thesis. In the early to middle 1900s, gardening was to some extent regularly practiced among all of the Native communities in the flats, with Arctic Village being the most common exception because of climate and landscape challenges. To provide a better picture of the information contained in these records, I will summarize them here for the villages of Arctic Village, Beaver, Fort Yukon, Minto, Stevens Village and Venetie. The configurations of cropping included 4-H school gardens, family gardens (very informal, often unfenced bits of land that often went unweeded, and in some cases just randomly planted potato plants), as well as more structured community gardens. The reported levels of Native participation and total crop yields varied greatly from year to year, and the details of this variation provide conflicting information. In general, these villages gardens all favored root-crop production (especially potato), but a wide variety of produce was grown, most commonly including (but not limited to) beans, beets, cabbage, carrots, celery, chard, kale, lettuce, peas, radishes, rutabagas, and turnips (see table 2 for some information on the most

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<sup>13</sup> C.W. Holland, ANS Schoolteacher, ‘Annual Survey of Native Food’; File 917, Ag. Statistics & Production: Minto 1941-63; AHF2; RR; RG75; NAPA.

commonly suggested crop varieties). Much of the information presented is synthesized from these records, but this paper is also informed by data for these communities as compiled by Andrews (1988), Caulfield (1983), and Sumida (1989), (among others, all cited appropriately) as well as from one-on-one interviews with Native Elders of the Minto community.

#### *1.6.1 Arctic Village 1960-1964*

For three of the four years that Arctic Village is represented in the archives, the school teachers reported that the existing food supplies were not sufficient for the coming winter. The village people depended “entirely on caribou,” though they had a desire to grow gardens. Such initiatives were hindered by the extreme cold, however; teacher Marie B. Mott suggested in 1960 and again in 1961 that plastic could be used, but that the natives had no income to purchase such supplies. Frederic Goranson, her successor, likewise didn’t see the possibilities in the village, claiming in his 1963 report that the “short growing season and variable summers makes gardening a risky proposition.” The BIA maintained a list of villages where gardening was considered practically impossible (see the section later on Venetie), and for which, therefore, garden surveys were no longer requested. As most of the documentation for these villages end in the late 1960s, however, it is impossible to glean from the small set of Arctic Village records if this was the case, or if gardening attempts continued past 1964.

### *1.6.2 Beaver 1940-1967*

The first garden records for the village of Beaver (1940-41) reported that over 4 acres of land were in cultivation, though a dry season had made for poor crop production. That year 5800 lbs of produce were harvested, used by all 27 families in the village. This level of output remains somewhat consistent (4000-5000 lbs) for over 20 years, with exceptions in the 1954-55 and 1958-59 seasons (600 lbs and 0 lbs respectively.) Interestingly, these same two years are either absent from the record of all the other villages surveyed,<sup>14</sup> or report little-to-no production as a result of “discouraging weather.” In 1963 spring floodwaters washed out the gardens, limiting production to about 1000 lbs. These low numbers continue through the final 3 reports; teacher Sue Price in 1965 attributes the lack of interest in gardening to contentment to rely on “welfare and pension checks,” and her successor, Nelson M. Page says in 1967 that there’s just a general lack of interest in gardening in Beaver.

### *1.6.3 Fort Yukon 1941-1958*

As mentioned in the introductory section on agriculture in Alaska, the people of Fort Yukon are known to have been growing gardens since at least the turn of the 20<sup>th</sup> century. For the period covered by these records, production was between 17,000-30,000 lbs of produce from a total of 4-5 acres of small family gardens as well as a community garden plot, from which 15-30 families were eating. In 1958, Lydia Fohn-Hansen,

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<sup>14</sup> Many teachers did not fill out garden reports for years where there was no production. Often the lack of submission is reflected in the records by a telegram from the BIA office requesting the missing material, though the reports themselves never seem to have been completed.

Associate Director for Home Demonstration Work, UA Cooperative Extension Service, wrote that all 28 families grew enough potatoes to feed 650 people for a year. The only exception to this was 1941 where 8 families produced 3000 lbs of vegetables. Fort Yukon gardeners consistently used some form of fertilizer: lime was used in 1941, replaced by commercial fertilizers such as “Vigoro” and “Mor-Crop” in later years. Corrosive sublimate (mercuric chloride) was also used by some as an insecticide. Despite the consistent garden success, numbers did not seem to please the ANS teachers – an attitude common among all the villages (for example, see Figure 1.7 for the letter that accompanied the 1957 report in which Alice S. Wilson reported 25,000 lbs of potatoes as only “fair.”)

#### *1.6.4 Minto 1941-1963*

Though many in Minto grew their own gardens (Olson 1981), unlike Fort Yukon (for which years of low garden activity were the exception) production under 1000lbs was the rule. 1943 stands out, with 8750 lbs of produce, up by a factor of 10 from the previous year, though output dropped again to 800 lbs the following year. Minto was very flood-prone, however, mentioned in reports by teachers C.W. Holland and Essie Lawson, and confirmed by Elders in the community as the biggest difficulty their gardens faced. Indeed the community eventually moved to a new location in 1969 because of the frequent flooding and erosion problem. Repeated years of relative failure post- 1943 seems to be the major factor behind the general lack of interest in the activity. Some interviewees, however, also suggest that interpersonal relationships between community

members and ANS teachers had played a role; Jens H. Forshaug, teacher in Minto in 1953 and 1954, apparently had notably poor relationships with community members, especially the children. In Mr. Forshaug's 1954 report, he stated that the local people "should have [gardens] if they were more ambitious"; a sentiment for which he is remembered most by Minto residents for not keeping to himself. Since he was in charge of the gardens, many people opted-out.

#### *1.6.5 Stevens Village 1941-1967*

Stevens Village has an interesting set of documents that contribute another aspect to this discussion; in particular, how the community integrated gardening into their larger annual and multi-annual cycles of subsistence activities, where gardening was practiced in some years, but not in others. In her 1941 garden report, teacher Dorothy Henry stated:

We are told that the reason gardens are not cultivated is because of the ratting season. That time is usually is from March 1st to May 31st. After ratting season the Natives return to town and stay long enough to get supplies then go to fish camp. This coming spring is the peak of the ratting season, the following years will show a decrease. Families will then stay in town, some will then make gardens as in previous years.

As predicted, gardening activity picked up in 1948 (1000lbs by 6 families), up to nearly 4000 lbs grown by all 12 families in 1952. Prior, the muskrat trapping, or "ratting" season, had kept people away from their village during the weeks they would otherwise need for preparing and planting their gardens. The ratting season was a 3 month segment

of the annual seasonal round for many Interior Athabaskan communities, which immediately followed winter trapping (Sumida 1989). Each family had its own “rat camp,” and entire families, men, women and children, were involved in the hunting and trapping activities. Even if some people remained in the villages, gardening in Stevens Village was labor-intensive and required frequent hauling of water from the Yukon. In more recent years the practice has been dramatically scaled back, first to a separate 3-4 week spring trip in May to these traditional rat camps (1940s, 50s), and most recently only survives as a handful of day-long or overnight excursions (Nelson 1986; Schneider 1976; Sumida 1989). This change in strategy correlates with the population ecology of muskrats, which follows a multi-decadal cycle of expansion and contraction, whereby the muskrat population is influenced at least in part by some very nasty plant defenses that only manifest under extreme stress from herbivores (Bryant and Kuropat 1980; Elton 1951). The ‘peak’ Ms. Henry’s informants described, and the ensuing decline of ratting as a component of the seasonal round suggest a synchronized cycle of subsistence activities with ratting at one end, and as her words “as in previous years” implies, with gardening at the other.

#### *1.6.6 Venetie 1941-1971*

Just as the records of gardening in Stevens Village reflect a level of synchronization between subsistence cycles and those of the local ecosystem, Venetie’s gardening history bears a similar marker of knowledge of and responsiveness to multi-annual weather cycles. Frosts were reported in Venetie by ANS teachers from 1948 to

1955, years for which there was little to no local participation in gardens, other than what support the teacher could drum up through active campaigning. In 1953, the BIA sent a letter instructing then teacher Enda E. Hall to stop sending garden reports altogether, and that “there are certain villages where it is apparently practically impossible to raise a garden...Venetie is in this group.”<sup>15</sup> But in 1948, 49 and 50, the people of Venetie had reported that they were waiting for a period of frosts to end, before any worthwhile gardening could be pursued. As predicted, beginning in 1956 their garden productivity began a dramatic upswing. In 1962 the village garden yielded a recorded 24,000 lbs of potatoes (and another 4000 lbs of a variety of other produce), for which native gardeners won several awards at the state fair in Palmer; between 1961 and 1967, the Venetie garden consistently produced between 10 and 20 thousand pounds of produce.

## **1.7 DISCUSSION: INNOVATION, OVERINNOVATION, AND OUTPOST AGRICULTURE**

In an early letter to ANS schoolteacher Richard P. Birchill, Charles Hawkesworth of the BIA wrote:

It is clear with us that gardens will gradually be increased in size and the people will [then] have a third food resource. Heretofore the native people have secured their food from the water and from land animals. Now they should get the value

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<sup>15</sup> Chas. R. Mountjoy, Director, Div. of Resources, ANS, Juneau, AK, to Edna E. Hall, ANS Teacher, Venetie, AK; File 917, Agricultural Statistics & Production: Venetie 1938-72; AHF3; RR; RG75; NAPA.

of garden crops, and thus have a varied diet. This is being done throughout the territory where soil is suitable. (Hawkesworth, 1938)

We now know that the aboriginal diets and substance patterns of Athabascan and Eskimo communities were in fact far more diverse, in both content and nutrition, and historically far more reliable, than they appeared to the educators, administrators and bureaucrats like Hawkesworth, many of whom had short tenures and rarely saw the villages for which they made policy<sup>16</sup> (Gadsby 2002; Grivetti and Ogle 2000; Holloway and Alexander 1990; Nelson 1986). Nevertheless this quote makes for a nice introduction to answering this question because it introduces the general perception that garden projects, as a matter of rural development, had to represent a major component of the local economy and diet to be considered a success. In a letter from Lydia Fohn-Hansen of the UA Cooperative Extension Service to Max Penrod, Educational Director of the BIA<sup>17</sup>, she stated that “Food production is only a part of the answer to the plight of Alaskan villages. What is needed is a community development plan ... to promote social, economic, health and technological innovation” (1958). These goals of dramatic, overall economic development and social transformation were not met by the village gardening initiatives, and as such any successes, like the 25,000 lbs of potatoes grown by people from Venetie on a total of 2 cultivated acres of land were marginalized or dismissed altogether, eclipsed by the perception that no long-term developmental progress was being made towards a more “civilized” life as agriculturalists.

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<sup>16</sup> The longest number of consecutive years an ANS schoolteacher reported for a village was 5 years (Mr. Richard P. Birchill 1960-1964), the most common however was just 1 year. Many left the villages during the summer, and did not participate in subsistence activities.

<sup>17</sup> Lydia Fohn-Hansen, UA CES, to Max Penrod, Educational Director, Bureau of Indian Affairs, 4/18/1958; Folder 947;GS;GSC;RR;RG75;NAPA.

Such dogma is well understood in development anthropology as common to a colonialist attitude and belonging to “the fallacy of overinnovation:” where top-down prescriptions for development are made that are negligent to local social and cultural structures (Kottak 1990; Merry 2000; Delcore 2004). Overinnovation is part of a development narrative which incorporates “planners’ values,” e.g. progressing, efficiency, modernization, and operates under the assumption that it can and should happen along a very specific teleological timeline (Kottak 1990). In the case of Alaska, perceptions of food insecurity and need in rural communities were in some cases real, others only perceived, but regardless the BIA pursued a rigorous program of rural education and development both rooted in and fueled by a long-held belief in agriculture as a nearly-divine mechanism of economic development and civil progress (Quinn 1991). The single-mindedness of this ‘overinnovative developer’ mindset, coupled with the ignorance to the complexities and nuances of the local life ways, made BIA agents unable to see the extent to which gardening actually *had* been integrated into the communities’ subsistence strategies.

Indeed the Alaska Native communities of the flats region saw great potential in crop cultivation, and experimented with new and different ways to incorporate the practice into their strategies. Though he was not directly concerned with Native communities, Dr. Francis (1967) was mindful of the special circumstances for agriculture in the state when he wrote about agriculture in Alaska, recognizing that its place within an Alaska economy was very different in nature than classic “pioneer” or development agriculture:

In reality, agriculture in Alaska is of the unusual kind that supplies an outpost. It can be likened to the garden behind the fur trading post, or the greenhouse annex to the Arctic research station. It is neither integrated nor, as it is today, integrable [sic] with the open markets of the nation. In fact, the closer the economy of the rest of the nation comes to Alaska, the smaller becomes the function of Alaskan agriculture. (Francis 1967)

Though agriculture in Alaska could not in either the short or the long term follow the same developmental path that it had in the lower-48, it could (and did) in Kottak's words (1990) meet more "down-to-earth and specific objectives," as a flexible, supplementary, stabilizing activity which can be easily and informally integrated with the existing local economies. We can read between the lines in these records, especially in those of Stevens Village the ratting season, and Venetie and the frosts, to see that the variability of participation in native gardening was not a failure, but indicative of a process of experimentation that happened outside the dominant narrative of development, where cropping became incorporated within a set of heterodox strategies that valued diversity over economic growth and followed not just a yearly seasonal round of activities but also multi-year and in some cases multi-decadal ecological and climatic cycles (Nelson 1986; Krupnik and Jolly 2002).

## **1.8 CONCLUSION**

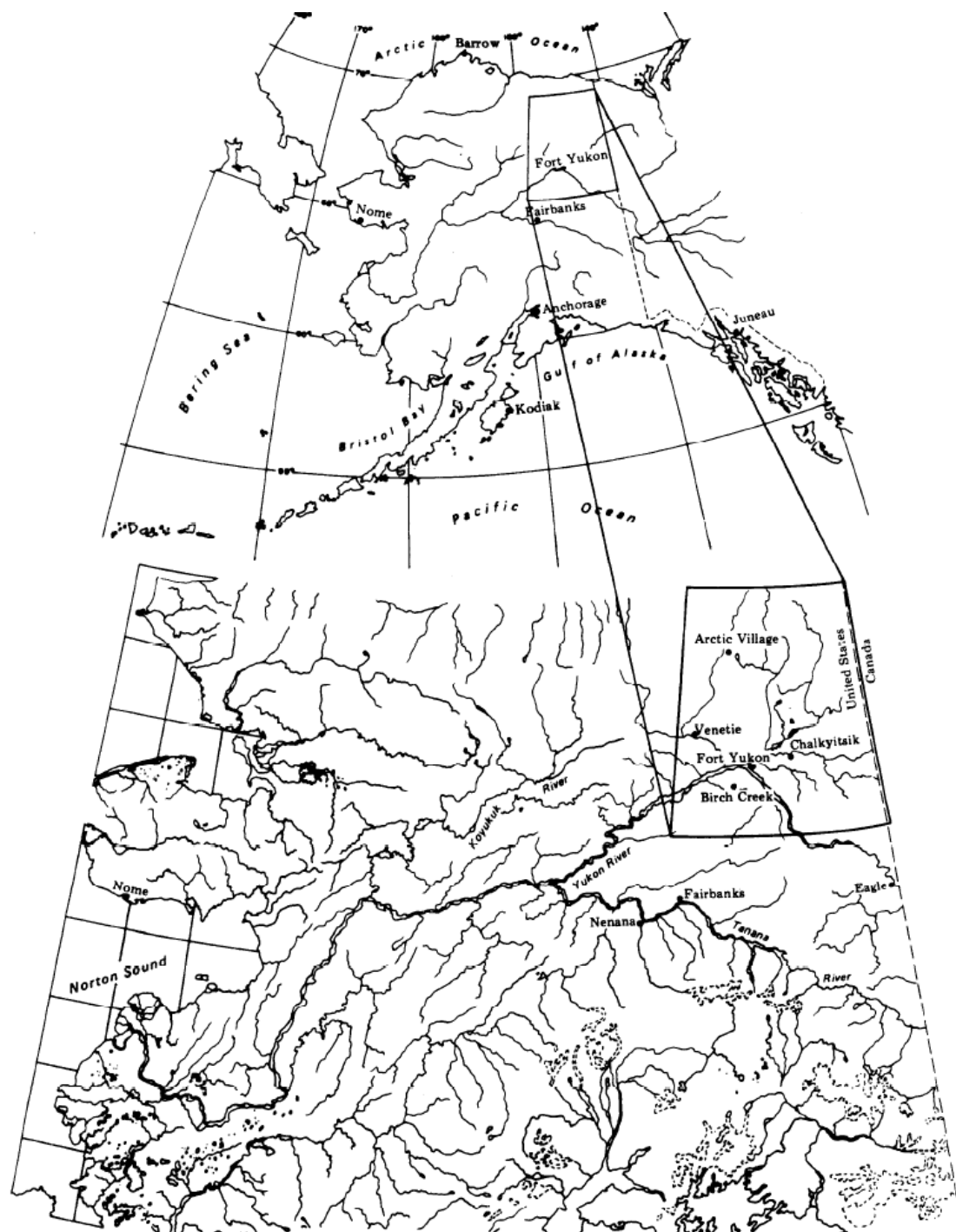
Francis (1967) also predicted the inherent vulnerability of outpost agriculture to the influence of the national economy, and native outpost gardens were eventually made

irrelevant (or so it seemed) by the encroachment of a cash economy and the decrease in transportation costs that brought the nation's cheap food surplus to the shelves of local trading posts and village convenience stores. Today the foodstuffs on the shelves of the local store are still viewed as providing a measure of food security; but as our understanding of the caveats of the nutritional and political economies of cheap food increases, outpost agriculture is finding a renewed niche in emerging indigenous movements against the vulnerabilities embedded within participation in the cheap food system (Kloppenborg et al. 1996). Native communities, including many in the flats, are trying to recover and redevelop local gardening expertise in an attempt to break the cheap-food addiction that has brought with it plagues such as type II diabetes and obesity (Nobmann et al. 1992; Kuhnlein et al. 2004). Villages like Minto and Fort Yukon are experimenting with new or intensified village gardening and farming strategies to complement other traditional subsistence activities, with clear implications for increasing the quality and quantity of food that is produced locally, for reducing vulnerability to external economic forces, and for contributing to better individual and community health (Gerlach et al. in press; see also chapter 3 in this volume).

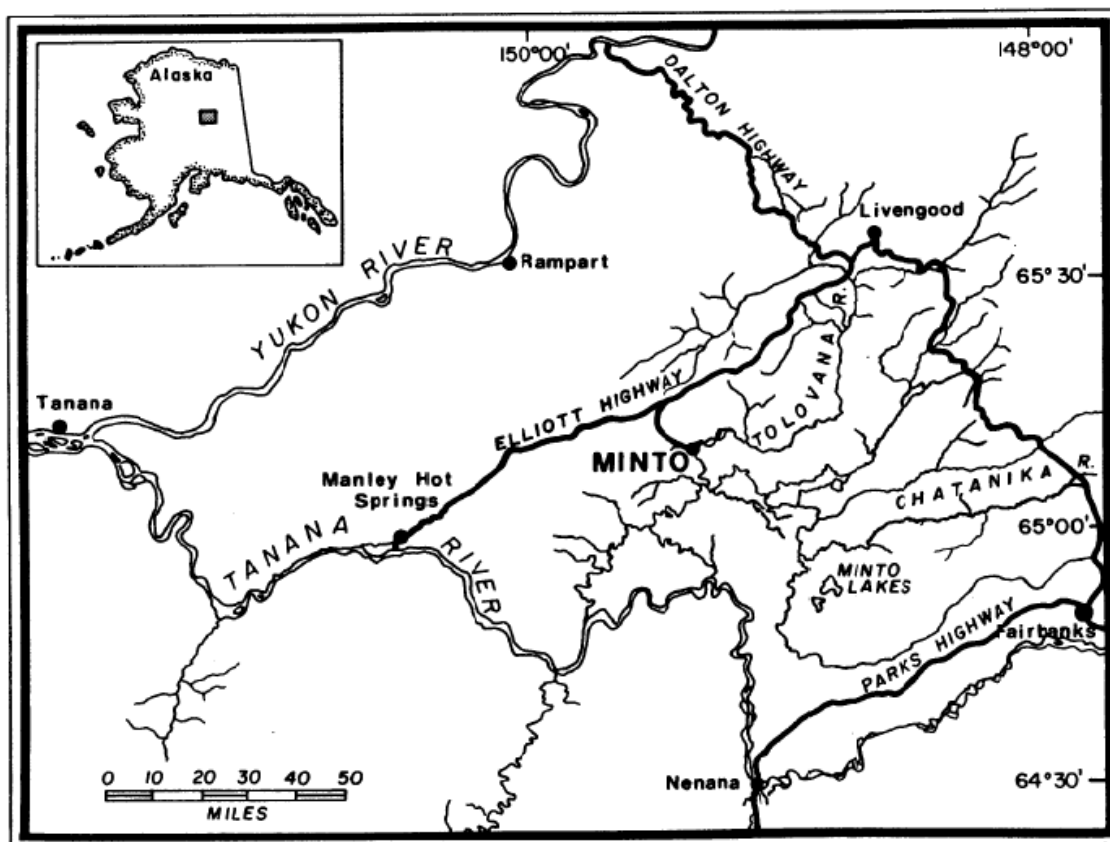
However, the "customary and traditional" legal framework described here, as it is presently interpreted and enforced by state and federal agencies, does not make room for the kind of cultural experimentation that these new initiatives represent. Such experimentation is imbedded within the historical patterns of innovative behavior obscured beneath the biases of these BIA archives. Though there is a paucity of documentation of cropping by Alaska Natives in both institutional and academic

literature, outpost gardening played an important, albeit intermittent role within the local foodways of Interior Alaskan communities. As the records explored here reveal, this was not simply an imported and regulated behavior but a locally-adapted strategy that falls well within the realm of customary and traditional. Native outpost gardens should, in fact, be regarded as a success, not a failure, because of how readily, when the conditions and timing was right, communities were able to integrate them into their already diverse and variable subsistence economies. By bringing these historical patterns into the contemporary dialogue, new and tractable interpretations and implementations of these frameworks become possible: ones that make room for the kind of flexibility and innovation that many argue is required again if communities like those of the Tanana River and Yukon River flats are to respond successfully to new threats to their livelihoods, such as the down-scale impacts of globalization and global climate change (Anderson 1998; Folke et al. 2003; Gerlach et al. in press; Irvine and Kaplan 2001).

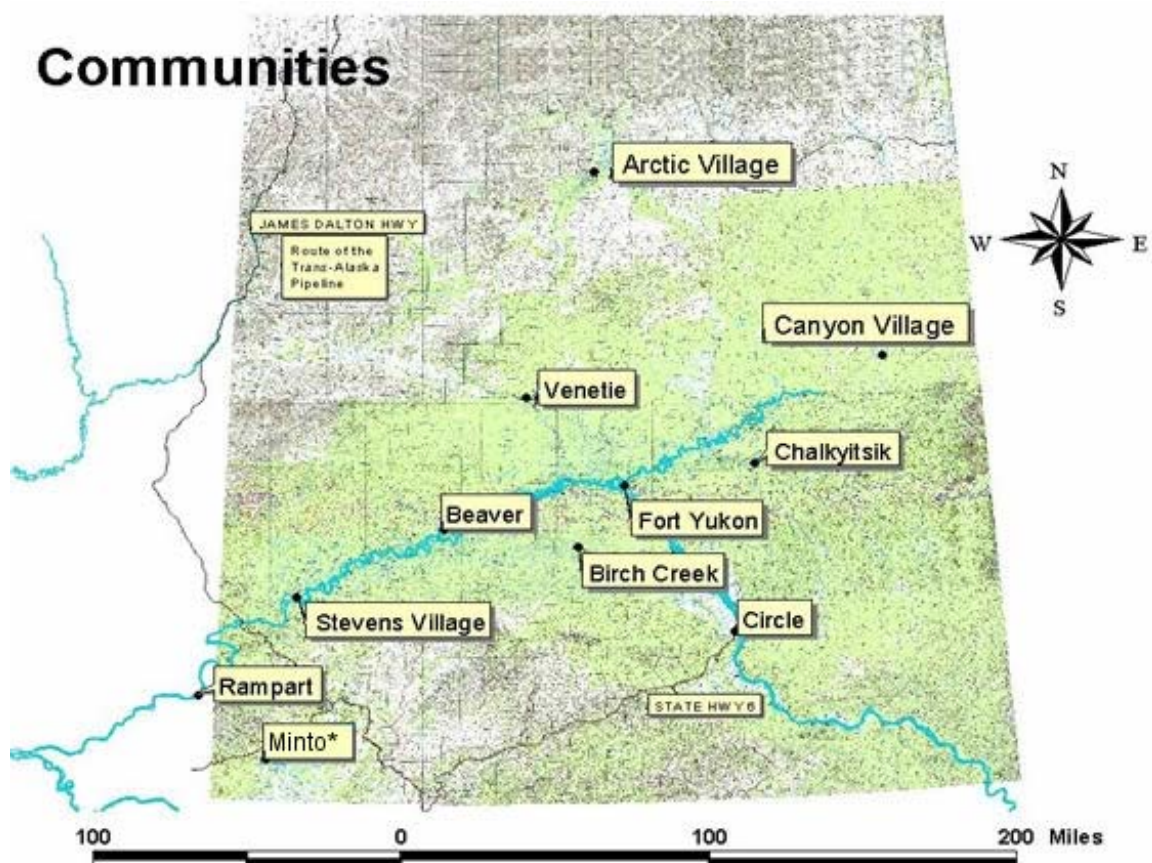
## 1.9 FIGURES



**Figure 1.1. Map of Alaska and the Yukon Flats Area.** Interior Alaska, with some of the villages of the Upper Yukon River Watershed identified (Caulfield 1983).

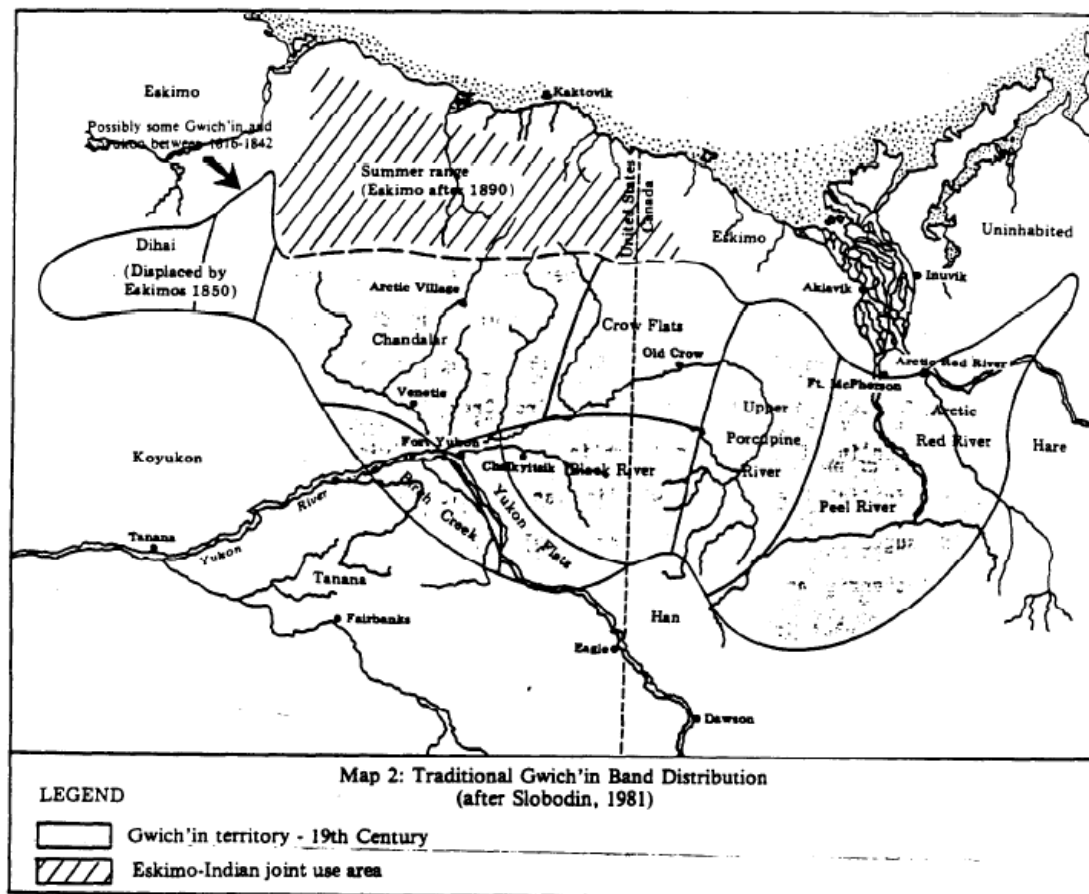


**Figure 1.2. Map of Minto and the Tanana Flats Area.** Location of Minto and the Minto Flats in relationship to Fairbanks and the Tanana and Middle-Yukon River. From (Andrews 1988).

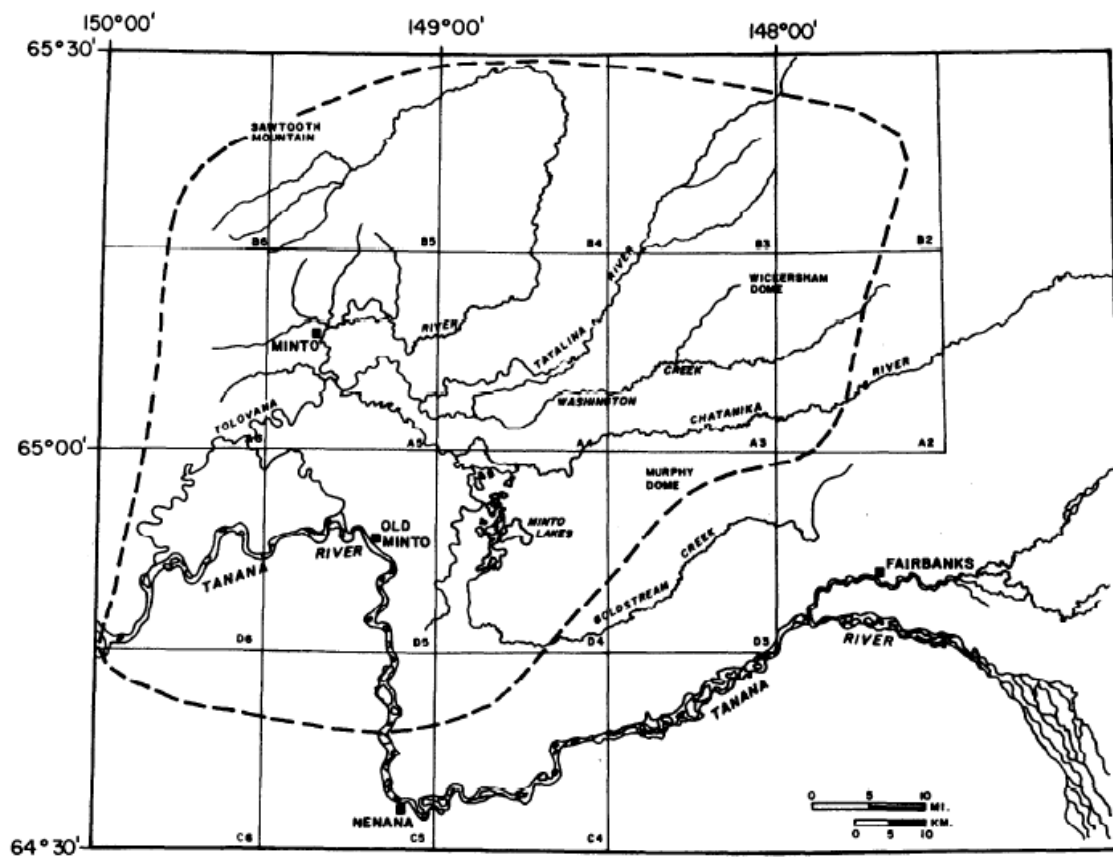


**Figure 1.3. Map of Communities in the Study.** All of the communities represented in this research.

\*Minto is the only community shown that is not a members of the Council of Athabascan Tribal Governments (CATG) (CATG 2007).



**Figure 1.4. Upper Yukon Land Use.** Historic range of land use recorded for the Athabascans of the upper Yukon River communities (Caulfield 1983)




**Figure 1.5. Lower Tanana Land Use.** Historic range of land use by Tanana Athabascans as compiled by ADF&G. From (Andrews 1988).



**Figure 1.6. AK Federal Lands and Reservations** A patchwork of land ownership and management regimes serves to confound the Alaska Native’s ability to move across the landscape. Note this map only shows Federal Land holdings; state-owned-lands add a second layer of complication (Nationalatlas.gov 2003)

IN REPLY REFER TO:



UNITED STATES

DEPARTMENT OF THE INTERIOR

BUREAU OF INDIAN AFFAIRS

APR 24 1957

ATT.	INITIAL	DIVISION	ACT. BY
		AREA DIRECTOR	
		ASST. AREA DIR.	
		FIN. OFFICER	
		ENGINEER	
		EDUCATION	
		WELFARE	
		CONSTRUCTION	
		RESOURCES	
		PERSONNEL	
		PAYROLL	
		BOOKKEEPING	
		I & A	
		VOUCHER AUDIT	
		PROP. & SUPPLY	
		INFORMATION	

Fort Yukon, Alaska,  
April 20, 1957.

Mr. Vern V. Hirsch,  
Land Operations Officer,  
Bureau of Indian Affairs,  
Juneau, Alaska.

Dear Mr. Hirsch:

Thank you for your letter of April 17. Attached is the Annual Survey of Garden Activity Report showing the estimated production of Fort Yukon gardens for 1956.

Due to an unusually early frost, the potato crop was cut short. The yield was fair however. Thirty native families planted potatoes. The total yield was approximately 25,000 pounds and the greatest yield from any garden was 2,000 pounds. Most families raised enough potatoes to supply food for the winter. Many sold potatoes and several have saved potatoes for planting. Potatoes were planted west of the Bureau of Indian Affairs School but each gardener planted small vegetables near his home.

The water hose arrived on the last boat and has not been unpacked. The two pipe coupling valves arrived after we had the irrigation equipment set up so they were not used. Everything that you sent is new and in readiness for use this year.

Herb joins me in best wishes to you.

Sincerely yours,  
*Alice S. Wilson*  
Alice S. Wilson  
Bureau of Indian Affairs Teacher

**Figure 1.7. Sample BIA Letter from Fort Yukon.** Example of garden correspondence. This letter is a summary of the garden productivity for Fort Yukon's most productive reported year, but also provides an excellent example of the challenges associated with the endeavor, including frost and irrigation concerns.

## ANNUAL SURVEY OF NATIVE FOOD

Kind of Food	Quantity in Village (Pounds)	Method of Preserving	Remarks
FISH	10,000	Dried and smoked and canned	Less than usual.
MEATS	1,800	Dried or canned	Not killed in summer faster than is needed.
*WILD FRUITS & VEG.	900	Kegs and cans to be frozen	High water all summer reduced natural production.
OTHER FOODS			

TOTAL - - - - - 12,700

Number of people dependent on this supply 134.

Number of work dogs dependent on this supply 112.

Comment on adequacy of supply--if inadequate what could be done to increase supply? Inadequate because too many boys entered war work for big wages. Increase supply by stopping the war.

What source of native food will be available during the winter, e.g., reindeer, fish, etc. Moose, bear, fish, birds, etc.

\*Other than those raised in the garden.

Station Minto

Reported by C. W. Holland

Date of report 9-27-44 covering period from XXI Present time. 194.  
month month

Make report in duplicate, retaining one copy your files

Figure 1.8. Native Food Survey. Example of a Native Food Survey, from Minto, completed by C.W.

Holland, 09/27/1944

## ANNUAL SURVEY OF GARDEN ACTIVITY

Minto  
VPE

Indicate Dates

Kind of Vegetable	Planted Indoors	Trans-planted	Harvested	Total Yield Pounds	Fertilizer Used	Method of Cultivation*
Beans						
Beets				200	Fish scraps	
Cabbage	Mar. 15	May 15	Sept. 10	2000	Commercial	Corrosive Sublimate &
Carrots				300	Fish	Muriatic Acid for worms
Celery	Mar. 1	May 31	Sept. 15	200	Commercial	
Chard						
Kale						
Lettuce				100		
Onions						
Pears				50		
Potatoes				5500	Fish & Comm.	" for seed dip
Radishes						
Rutabagas				100		2 for worms
Spinach						
Turnips				300		" for worms
Tomatoes						

8750

Approximate total area in your community under garden cultivation 3 acres.Number of Native families producing any part of their food supply from gardens 13.

What is your opinion regarding the possibility and desirability of developing projects in your community?

Has been, is being, and must continue to be encouraged.

Did the children have a school garden? Yes.

Is irrigation necessary? Yes.

Comments and suggestions

\*e.g., cold frames, hot beds, insecticides used, etc.

Remarks:

Station Minto  
 Reported by C. W. Holland  
 Date of report 9-27-44 covering period from Mar. 1944 to Sept. 1944.  
 month month  
 Make report in duplicate, retaining one copy your files.

Figure 1.9. Native Garden Survey. Example of a Native Garden Survey, from C.W. Holland, 09/27/1944

## 1.10 TABLES

**Table 1.1. Village Summary Data.** Some general information regarding village gardening and BIA archival data for the researched villages.

Village	Years Reporting (n)	Earliest mention of Gardening	Average Pop.	Avg. # of families eating from garden	Productivity Range (lbs, min-max)
Arctic Village	1959-62 (4)	1959	86	0	0 – 13.5 lbs
Beaver	1940-67 (13)	1936	92	11	0 – 6300 lbs
Birch Creek	1963-67 (2)	1962	32	3	1863 – 2400 lbs
Canyon Village	1964-67 (2)	1964	37	2	0 – 285 lbs
Chalkyitsik	1946-66 (5)	1946	77	7	0 – 5600 lbs
Circle	1944-57 (8)	1944	66	6	345 – 1900 lbs
Fort Yukon	1941-56 (4)	1898	382	25	3000 – 29700 lbs
Minto	1941-63 (13)	1933	140	8	180 – 8750 lbs
Stevens Village	1941-67 (15)	1941	72	8	0 – 3900 lbs
Venetie	1941-71 (15)	1931	81	10	0 – 28095 lbs

**Table1.2. Recommended Crop Varieties.** Where possible in tables 1.2a and 1.2b I've tried to represent the suitability of each to Interior Alaska, though identical data was not available for each variety. Note all vegetable types are still recommended for use in Alaska (CES 2001); Whether these specific varieties are still recommended in the region comes from (Wagner, Matheke, and Hemshrot 1989) and (Hebert and Matheke 2001) Maturation times and descriptions are from (Whealy 1985). Some data also from (Wehner et al. 2006). \*Comparative performance is the percent of the average yield of the listed variety as compared to that of the top 5 varieties, from (Wagner et al. 1989). \*\*Wide adaptation means adapted to a wide range of climates. \*\*\*General means adapted to average US temperate climates.

Vegetable	Variety	Still Recomm?	Days to Maturity	Comparative Performance	Transplant	Frost Resistant	Geographical Adaptation	Comments
Beans	Tendercrop	No	61	45%	n/a		Northern, Midwest, West	Needs plastic; sunny, warm soil.
Beans	Topcrop	No	53	64%	n/a		Wide	Needs plastic; sunny, warm soil.
Beans	Cherokee Wax	No	58	n/a	n/a		General	Needs plastic; sunny, warm soil.
Beets	Redball	No	60	n/a	n/a	Yes		
Beets	Detroit Dark Red	Yes	70	n/a	n/a	Yes	Wide	High tolerance to bolting
Cabbage	Early Jersey Wakefield	No	75	n/a	4 Wks	Yes		Can overwinter; resists splitting, for an early spring planting
Cabbage	Copenhagen Market	No	80		4 Wks	Yes	Eastern U.S.	Cool season crop that can be planted early in the season
Carrots	Nantes Half-long, Scarlet	Yes	70	78%	n/a		Wide	Suited for shallow soils; produces high yields and stores remarkably well.
Carrots	Royal Chatenay	Yes	70	94%	n/a			For shallow soils
Carrots	Nantes Improved Coreless	No	62	50%	n/a			
Cauliflower	Snowdrift	No	70	33%	4 wks	Yes		
Cauliflower	Super Snowball Improved	No	60	62%	4 wks	Yes	Wide	
Celery	Dwarf Golden Self-Blanching	No	80	n/a	9 wks		Wide	
Kohlrabi	Early Purple Vienna	No	69	n/a	n/a			
Kohlrabi	Early White Vienna	No	65	n/a	n/a			
Lettuce	Ruby	Yes	65	n/a	3-4wks		Wide	Heat resistant; won't fade in hot weather
Lettuce	Slobolt	No	48	n/a	3-4wks		Wide	High tem. Resistant
Lettuce	Grand Rapids	Yes	65	n/a	3-4wks		Greenhouses	For greenhouses
Lettuce	Premiere Great Lakes	No	90	n/a	3-4wks		Spring, summer, early fall	Grows well in heat and resistant to drought
Lettuce	Salad Bowl	Yes	68	n/a	3-4wks		Wide	High temp. resistant
Parsely	Extra Curled Dwarf	Yes	85	n/a	n/a			Moss-like
Peas	Freezonian	Yes	70	66%	n/a		Wide	Heavy crops even in hot, dry weather. Performance only 2/3 of preferred varieties
Potatoes	Not Specified	Yes	90-120	n/a	n/a	Yes	Wide	Exceptionally well suited to AK, though varieties were not specified in BIA materials.
Radish	Cherry Belle	Yes	30	n/a	n/a	Yes		From Holland. Bolts easily in AK
Radish	Early Scarlet Globe	Yes	28	n/a	n/a	Yes		For frame or greenhouse. Bolts easily in AK
Radish	Icicle	No	30	n/a	n/a			Plant spring or fall
Rutabagas	American Purple Top	Yes	120	n/a	n/a			
Squash	Caserta	No	57	n/a	4 wks	Yes(Fall)	Wide	
Squash	Harris Hybrid Cocozelle (F1 Hybrid)	No		n/a	4 wks		Eastern US	
Turnips	Early Red	No	45	n/a	n/a			
Turnips	Purple Top Strap Leaf	No	60	n/a	n/a			

## 1.11 REFERENCES

- Agatha, Sister Mary of the Angels. 1965. Social Adaptation of the Alaska Native to White Culture, Sociology, Gonzaga University, Spokane.
- AKDEC. 2007. *Community Database Online*. Alaska Department of Commerce, Community and Economic Development 2006 [cited 2/8/2007 2007]. Available from [http://www.commerce.state.ak.us/dca/commdb/CF\\_BLOCK.cfm](http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.cfm).
- Allison, Helen E., and Richard J. Hobbs. 2004. Resilience, Adaptive Capacity, and the "Lock-in Trap" of the Western Australian Agricultural Region. *Ecology and Society* 9 (1):3-27.
- Anderson, Ray C. 1998. *Mid Course Correction: Toward a Sustainable Enterprise: The Interface Model*. White River Junction: Chelsea Green Publishing Company.
- Andrews, Elizabeth F. 1988. The Harvest of Fish and Wildlife for Subsistence Use by Residents of Minto, AK. Juneau: Alaska Department of Fish and Game.
- Archives, U.S. 1975. RG 75: BIA Fact Finder: Reindeer Records. Anchorage: U.S. National Archives.
- ARDC. 1974. Alaska's Agricultural Potential, edited by T. Freeman, C. E. Logsdon, L. J. Klebesadel and J. A. Smith. Fairbanks: The Alaska Rural Development Council.
- Bockstoe, John R. 1986. *Whales, Ice and Men: The History of Whaling in the Western Arctic*. Bellingham: University of Washington Press.
- Bryant, John P., and Peggy J. Kuropat. 1980. Selection of Winter Forage by Subarctic Browsing Bertebrates: The Role of Plant Chemistry. *Annual Review of Ecology Systematics* 11:261-285.
- Case, David S. 1984. *Alaska Natives and American Laws*. Fairbanks: University of Alaska Press.
- CATG. 2007. Communities of the Yukon Flats. Fort Yukon: CATG.
- Caulfield, Richard. 1983. Subsistence Land Use in Upper Yukon Porcupine Communities, Alaska. Dinjii Nats'aa Nan Kak Adagwaandaii. Report #16: Alaska Department of Fish and Game.
- . 2002. Food Security in Arctic Alaska: A Preliminary Assessment. In *Sustainable Food Security in the Arctic*, edited by G. Duhaime. Alberta: CCI Press.
- CES. 2001. 16 Easy Steps to Gardening in Alaska, edited by M. Hebert. Fairbanks: University of Alaska Fairbanks Cooperative Extension Service.

- . 2006. Sustainable Rural Communities Program. Review of Reviewed Item. *Cooperative Extension Service*, <http://www.uaf.edu/coop-ext/ruraldevelopment/npp.html>.
- Dean, Jonathan R. 1995. "Uses of the Past" on the Northwest Coast: The Russian American Company and Tlingit Nobility, 1825-1867. *Ethnohistory* 42 (2):265-302.
- Delcore, Henry. 2004. Development and the Life Story of a Thai Farmer Leader. *Ethnology* 43 (1):33-50.
- Duhaime, Gerard, ed. 2002. *Sustainable Food Security in the Arctic, Occasional Publication Series*. Alberta: CCI Press.
- Elton, Charles. 1951. *Animal Ecology*. London, UK: Sidgwick & Jackson, Ltd.
- Folke, Carl, Johan Colding, and Fikret Berkes. 2003. Building resilience and adaptive capacity in socio-ecological systems. In *Navigating Socio-ecological Systems*, edited by F. Berkes, J. Colding and C. Folke. Cambridge, UK: Cambridge University Press.
- Francis, Karl E. 1967. Outpost Agriculture: The case of Alaska. *Geographical Review* LVII (4):496-505.
- Gadsby. 2002. The Inuit Paradox. *Discover*:12-14.
- Georgeson, C. C. 1902. The Possibilities of Alaska. *National Geographic Magazine* 13:81-85.
- Gerlach, S.C. 1996. Historical Archaeology and the Early Twentieth Century Reindeer Herding Frontier on the Northern Seward Peninsula, Alaska. In *Ublasaun: First Light*, edited by J. Schaaf and T. Smith. Fairbanks: U.S. Department of the Interior, National Park Service.
- Gerlach, S.C., A.M. Turner, L. Henry, Philip Loring, and Craig Fleener. in press. Regional Foods, Food Systems, Security and Risk in Rural Alaska. In *Circumpolar Environmental Science: Current Issues in Resources, Health and Policy*, edited by L. K. Duffy and K. Erickson. Fairbanks: University of Alaska Press.
- Grivetti, Louis E. , and B. M. Ogle. 2000. The Value of Traditional Foods in Meeting Macro- and Micronutrient Needs: The Wild Plant Connection. *Nutrition Research Reviews* 13:1-16.

- Hanscom, Jan. 1998. *Agroborealis*, edited by J. Hanscom. Fairbanks: School of Agriculture & Land Resources Management.
- Hebert, Michele. 2006. Interview.
- Hebert, Michele, and Grant Matheke. 2001. Vegetable and Fruit Varieties for INTERIOR Alaska. Fairbanks: University of Alaska Fairbanks Cooperative Extension Service.
- Hinckley, Ted C. 1966. The Presbyterian Leadership in Pioneer Alaska. *The Journal of American History* 52 (4):742-756.
- Holloway, Patricia S. , and Ginny Alexander. 1990. Ethnobotany of the Fort Yukon Region, Alaska. *Economic Botany* 44:214-225
- Huntington, Henry P. 1992. *Wildlife Management and Subsistence Hunting in Alaska*. Seattle, WA: University of Washington Press.
- Irvine, Katherine N, and Stephen Kaplan. 2001. Coping with Change: The Small Experiment as a Strategic Approach to Environmental Sustainability. *Environmental Management* 28 (6):713-725.
- Juday, G., R.A. Ott, D.W. Valentine, and V.A. Barber. 1998. Forests, Climate Stress, Insects and Fire. Paper read at Implications of Global Change in Alaska and Bering Sea Region, 1997, at Fairbanks.
- Kloppenborg, Jack, John Hendrickson, and George W. Stevenson. 1996. Coming into the Foodshed. *Agriculture and Human Values* 13 (3):33-42.
- Kottak, Conrad Phillip. 1990. Culture and "Economic Development". *American Anthropologist* 92 (3):723-732.
- Krupnik, Igor, and Dyanna Jolly, eds. 2002. *The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change*. Fairbanks: Arctic Research Consortium of the United States.
- Kruse, Jack A., Robert G. White, Howard E. Epstein, Billy Archie, Matt Berman, Stephen R. Braund, F.S. Chapin III, Johnny Charlie Sr., Colin J. Daniel, Joan Eamer, Nick Flanders, Brad Griffith, Sharman Haley, Lee Huskey, Bernice Joseph, David R. Klein, Gary P. Kofinas, Stephanie M. Martin, Stephen M. Murphy, William Nebesky, Craig Nicolson, Don E. Russell, Joe Tetlich, Arlon Tussing, Marilyn D. Walker, and Oran R. Young. 2004. Modeling Sustainability of Arctic Communities: An Interdisciplinary Collaboration of Researchers and Local Knowledge Holders. *Ecosystems* 7:815-828.

- Kuhnlein, H.V., O. Receveur, R. Soueida, and G. M. Egeland. 2004. Arctic Indigenous Peoples Experience the Nutrition Transition with Changing Dietary Patterns and Obesity. *Journal of Nutrition* 134 (6):1447-1453.
- LeBarron, RK. 1945. Adjustment of Black Spruce Root Systems to Increasing Depth of Peat. *Ecology* 26 (3):309-311.
- Loring, Philip. 2006. Soil Experiment: Calypso Farm is Staking Their Future on Building a Better Soil. *Sustainable Agriculture for Alaska* (July-September).
- Merry, Sally Engle. 2000. *Colonizing Hawai'i: The Cultural Power of Law*. Princeton, NJ: Princeton University Press.
- Mitchell, Donald Craig. 2003. *Sold American*. Fairbanks, AK: University of Alaska Press.
- Nationalatlas.gov. 2003. Alaska: Federal Lands and Indian Reservations. Reston, VA: U.S. Department of the Interior, U.S. Geological Survey.
- Nelson, Richard K. 1986. *Hunters of the Northern Forest: Designs for Survival among the Alaska Kutchin*. Chicago, IL: University of Chicago Press.
- Nobmann, Elizabeth, Tim Byers, Anne P Lanier, Jean H Hankin, and M Yvonne Jackson. 1992. The diet of Alaska Native Adults: 1987-1988. *American Journal of Clinical Nutrition* 55 (5):1024-1032.
- Norris, Frank. 2002. Alaska Subsistence. Anchorage: U.S. Department of the Interior, National Park Service.
- O'Neill, Katherine P., Eric S. Kasischke, and Daniel D. Richter. 2002. Environmental Controls on Soil CO<sub>2</sub> Flux Following Fire in Black Spruce, White Spruce, and Aspen Stands of Interior Alaska. *Canadian Journal of Forest Research* 32 (9):1525-1541.
- Olson, Wallace M. 1981. Minto, Alaska. In *Handbook of North American Indians*, edited by W. C. Sturtevant. Washington: Smithsonian Institution Press.
- Overpeck, Johnathan T. , Matthew Sturm, Jennifer A. Francis, Donald K Perovich, Mark C. Serreze, Ronald Benner, Eddy C. Carmack, F.S. Chapin III, S.C. Gerlach, Lawrence C. Hamilton, Larry D. Hinzman, Marika Holland, Henry P. Huntington, Jeffrey R. Key, Andrea H. Lloyd, Glen M. MacDonald, Joe McFadden, David Noone, Terry D Prowse, Peter Schlosser, and Charles Vorosmarty. 2005. Arctic System on a Trajectory to New, Seasonally Ice-Free State. *EOS* 86 (34):309-313.

- Pelto, Pertti J. 1987. *The Snowmobile Revolution: Technology and Social Change in the Arctic*. 2 ed. Prospect Heights, IL: Waveland Press. Original edition, 1973.
- Postell, Alice. 1990. *Where Did the Reindeer Come From?* Portland, OR: Amanak Press.
- Quinn, Daniel. 1991. *Ishmael*. New York: Bantam.
- Ransom, Jay Ellis. 1946. Aleut Natural-Food Economy. *American Anthropologist* 48 (4):607-623.
- Rupp, T.S., A.M. Starfield, F.S. Chapin III, and P. Duffy. 2002. Modeling the Impact of Black Spruce on the Fire Regime of Alaskan Boreal Forest. *Climatic Change* 55 (1-2):213-233.
- Sanderson, Eric W., K.H. Redford, B. Weber, K. Aune, D. Baldes, J. Berger, Dave Carter, C. Curtin, J. Derr, S. Dobrott, E. Fearn, Craig Fleener, S. Forrest, S.C. Gerlach, C. Cormack-Gates, J. Gross, P. Gogan, S. Grassel, J.A. Hilty, M. Jensen, K. Kunkel, D. Lammers, R. List, K. Minkowski, T. Olson, C. Pague, P. Robertson, and R.O. Stephenson. in press. The Ecological Future of North American Bison: Conceiving Long-term, Large-scale Conservation of Wildlife. *Conservation Biology*.
- Schneider, William S. 1976. *Beaver, Alaska: The Story of a Multi-Ethnic Community*, Anthropology, Bryn Mawr College, Ann Arbor.
- Shortridge. 1972. *American Perceptions of the Agricultural Potential of Alaska, 1867-1953*, Geography, University of Kansas.
- Stephenson, R.O., S.C. Gerlach, R.D. Guthrie, R. Harington, R.O. Mills, and G. Hare. 2001. Wood Bison in Late Holocene Alaska and Adjacent Canada: Paleontological, Archaeological, and Historical Records. . In *People and Wildlife in Northern North America: Essays in Honor of R. Dale Guthrie*, edited by S. C. Gerlach and M. S. Murray. Oxford: British Archaeological Reports, International Series 944.
- Sumida, Valerie A. 1989. *Patterns of Fish and Wildlife Harvest and Use in Beaver, AK*. Fairbanks: Alaska Department of Fish and Game.
- USFWS. 2007. *Yukon Flats National Wildlife Refuge*. U.S. Fish & Wildlife Service 2006 [cited 2/28/2007 2007].
- Wagner, Patricia, Grant Matheke, Donald H. Dinkel, and Marilyn Griffith. 1989. *Summary of Vegetable Variety Trials Fairbanks, Alaska 1978-1985*. Fairbanks: Agriculture and Forestry Experiment Station, University of Alaska, Fairbanks.

- Wagner, Patricia, Grant Matheke, and Steve Hemshrot. 1989. Recommended Vegetable Varieties for Interior Alaska. Fairbanks: Agriculture and Forestry Experiment Station, University of Alaska, Fairbanks.
- Wehner, Todd C., Linda Wessel-Beaver, Lisa Ann Sutton, Dermot P. Coyne, Micael W. Dickson, Philip Griffiths, Philipp W. Simon, Mark W. Farnham, Carlos F. Quiros, Edward J. Ryder, James D. McCreight, Earl T. Gritton, James R. Myers, and Irwin Goldman. 2007. *Vegetable Cultivar Descriptions for North America*. North Carolina State University 2006 [cited 1/25/2007 2007]. Available from <http://cuke.hort.ncsu.edu/cucurbit/wehner/vegcult/vgclintro.html>.
- Whealy, Kent, ed. 1985. *The Garden Seed Inventory*. Decora: Seed Saver Publications.
- Wikipedia. 2006. Black Spruce. Review of Reviewed Item. (2/27/2007), [http://en.wikipedia.org/w/index.php?title=Black\\_Spruce&oldid=94025333](http://en.wikipedia.org/w/index.php?title=Black_Spruce&oldid=94025333).
- Wolfe, Robert J., and Robert G. Bosworth. 2006. *Subsistence in Alaska: A Summary*. Alaska Department of Fish and Game 1990 [cited 2006]. Available from <http://www.subsistence.adfg.state.ak.us/download/subsum90.pdf>.

## CHAPTER 2

### A Services-Oriented Architecture (SOA) for Analyzing Social-Ecological Systems.<sup>13</sup>

#### 2.1 ABSTRACT

Similar to the ecosystem services concept, a ‘services’ approach to modeling complex systems is popular in the domain of information technology (IT). Called the Services-Oriented Architecture (SOA), it is a standardized framework with which businesses can describe the services they offer, how and where these services are provided, and the policies that govern their use. The SOA provides a straightforward, scalable and portable way to describe and organize complex systems. Success of this approach in the world of IT suggests its applicability in other domains. In this paper I discuss the particulars of the SOA as a way to further the usefulness of the ecosystem services concept for analyzing and modeling integrated social-ecological systems (SESs), present a prototype for its use, and then test it using an example from rural Alaska.

#### 2.2 INTRODUCTION

The ecosystem services concept, as described by Gretchen Daily is the “conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life” (1997:3). It quickly gained popularity because of its usefulness for recasting ecological function into economic terms (Costanza and others 1997), a translation which up until that point had confounded economists and natural

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<sup>13</sup> Loring, P.A. and F.S. Chapin III. in Preparation. A “services-oriented architecture” for analyzing social-ecological systems. *Ecosystems*.

resource managers. The Millennium Ecosystem Assessment (MA) (2005) further extended this concept, and side-stepped much of its controversy, by presenting ecosystem services in a qualitative, rather than quantitative way. In the MA, ecosystem services are used to describe, not just to assign value to the spectrum of benefits that societies derive from ecosystems, placing them into 4 categories: supporting, provisioning, regulating, and cultural services.

A similar ‘services’ approach to modeling complex systems, the Services-Oriented Architecture (SOA) is popular in the world of information technology (IT). Many businesses use the SOA to model the services they offer, how and where these services are provided, and the policies that govern their use. In practice, the approach has enabled computer software architects around the world to transform an internet characterized by heterogeneous, incompatible computer programs into a unified network of service-providers and service-consumers. The SOA has done so by establishing a common vocabulary and meta-data framework for capturing a spectrum of information about services. This paper presents an adapted version of the SOA framework to further enhance the robustness of the ecosystem services concept. Social-ecological interactions can be elaborated in a way that will help us to explore the four key components SES sustainability: resilience –in the details of service relationships that foster diversity and stability; vulnerability – via the service relationships that are highly specialized, monocultural, or lack redundancy; and adaptability and transformability – both through the conditions that allow system service providers and consumers to adapt, innovate, and self-organize, and by establishing a standard for viewing that change through time.

Because the SOA is easily scalable, the prototype presented here can be used to model the smallest ecological niche to the largest global system.

## **2.3 SERVICES AND THE SERVICES-ORIENTED ARCHITECTURE**

Many people outside the field of IT do not realize that IT analysts are far less concerned with technology, e.g. computers and computer software, as they are with information. An IT architect's primary responsibility is to design an efficient ontology, or way of knowing and describing complex systems. The SOA is one such ontology; it describes complex systems via the relationships that exist between their functional/organizational units, specifically service provider to service consumer relationships, and services are the 'stuff' of those relationships. And though reckoning one's business in terms of the services it provides is not a new concept, formalizing those services within a standardized meta-model is, and through information technology this practice has been a boon to companies' efficiency and flexibility. Though the SOA and ecosystem services were conceived separately, there is great similarity between the two. This section presents an adapted version of the OASIS SOA reference model created for the computer software industry for use with social-ecological systems (based on MacKenzie and others 2006). This prototype is not itself a model, but a set of unifying concepts, axioms, and relationships that are useful for modeling ecosystem services, their providers and their consumers. As a result of this section, a common vocabulary and shared understanding of the SOA should emerge, one that precedes the particulars of its use in the real world.

One goal of learning the language of the SOA is to be able to better organize complex systems into a collection of loosely-coupled functional units. This makes it easier to investigating issues such as substitution, a notion of great importance in the discussion of ecosystem services. Erlich and Mooney (1983) first discussed substitution in terms of extinction events and the series of consequences that follow. Today the notion extends well into the realm of natural resource management, in terms of weighing economic tradeoffs and planning ecological damage mitigation. For example, contemporary challenges regarding non-renewable resource extraction and global climate change are making questions of ecosystem service substitutability (e.g. between coal, solar, wind, oil and hydrogen-based power) immediate. An SOA-style model of ecosystem services, which delineate the inputs and outputs related to one or a group of ecosystem service providers and consumers, helps managers and scientists the enumerate requirements for such substitution and mitigation measures.

One of the ways that the SOA achieves this is through **typing**. Services at the most basic level share a handful of characteristics, but in practice have a number of details that are specific to their type. Consider the differences between a television set and a computer monitor: both are types of visual display devices, which despite their many differences share a basic set of characteristics and uses. To someone designing a security system, it is useful to be able to consider them side-by-side despite their differences in order to determine which would make the best choice, or how to substitute one for the other. The MA has already established the types of ecosystem services:

supporting, provisioning, regulating, and cultural services, and these four types work well within the SOA.

## 2.4 THE SOA PROTOTYPE

Figure 2.1 illustrates the main components of the SOA prototype. A service is the representation of one or more functions that one or more entities within an SES can provide. These are called the **service provider**. Services can also have one or more **service consumers**; cases where a service provider can be identified but there are no consumers, for instance a population of animals with no predators, represent either a point of instability or of untapped potential. When modeling the dynamics of interaction between service providers and consumers, it is important to first record some information specific to the services themselves. These include things key to understanding a service's viability, such as interfaces, constraints, policies and contracts related to its consumption (explained in more detail below).

### 2.4.1 Service Viability

For a provider-consumer relationship to be realized it must first be viable; **viability** in this respect is a result of four traits: compatibility, reachability, awareness, and willingness. Consumption of services first requires that the provider's delivery mechanisms – its **interfaces** – are **compatible** with and **reachable** by the consumer. Ecosystem services are useless unless they can accommodate the consumer's specific physiological and psychological requirements for using that service. For ecosystem

services these might include the harvest of food or the action of hunting, but at a smaller ecological scale interfaces might include different physical or even chemical processes. A wall-outlet makes an excellent example of a technological interface for accessing the service of potential energy from a local electric company.

Compatibility is often also a matter of the **constraints, policies** and **contracts** in place regarding service consumption. Constraints are physical limits or ecological thresholds, such as the maximum rate of carbon sequestration per square acre of wetland or the maximum sustainable yield of a fishery. They are driven by the service provider's supporting services, underlying ecosystem and population processes. Policies are similar to constraints; they don't manifest naturally but have been levied through human action, and can reflect the spectrum of social institutions that govern human action within ecosystems, such as fishing quotas or cultural taboos; contracts are active agreements between providers and consumers and often represent an agreement between parties on various policies, but can also address more esoteric issues such as equity or justice. Whereas constraints cannot be ignored, policies and contracts can be broken. Policies and contracts can also be levied upon the service use in terms of the outcomes of its consumption, e.g. air pollution quotas.

A service's reachability is similar to its compatibility, but is concerned with the spatial and temporal practicality of interaction (constraints), rather than its functional possibility, and is one way which contracts influence service use. Landscape structure, for instance, often influences the reachability of ecosystem services by consumers.

**Awareness** and **willingness** are the final two components of viability, which only

become relevant for service consumers that involve some form of agency. In the cases where ecosystem service consumption involves choice, the agent-consumer must be both aware that the service is available to them, and also must be a willing consumer.

#### *2.4.2 Example 1: The Electric Company*

An electric utility company is often used to showcase the SOA, and is a good example of service viability. The utility company (the service provider) generates and distributes electricity (the service) to residential and business areas, and consumers of this service access the electricity via a wall outlet (service interface) in their home. In order to use the electricity, a consumer needs to understand what type of plug to use and the voltage of the supply (service constraints), possible limits to the load (service policy) and other details. A residential or business user will need to open an account with the utility in order to use the supply (service contract) and the utility will meter usage and expects the consumer to pay for use at the rate prescribed (another service policy). When the consumer and utility company commit to the constraints and policies specified within the service contract (willingness), the consumer can receive electricity using the service as long as the electricity distribution grid and house connection remain intact (e.g. a surprise event like a storm knocking down power lines would disrupt distribution) and the consumer, in order to continue service consumption must be able to afford and have the appropriate method of payment (e.g. a check by mail or electronic funds transfer) for the utility (reachability). Of course the consumer would have never opened an account in the first place if they did not know the company existed (awareness).

### *2.4.3 The Service Interaction and Outcomes*

The consumption of services is not always a passive enterprise. Often, successful interaction requires knowledge of the appropriate **consumer and producer behavior**, i.e. orchestration or choreography of events. This manifests itself naturally in phenomena such as mating rituals, but is also especially prevalent as a result of the intersection of culture with ecosystem service consumption. For example, there may be complex behavioral rituals that surround the harvest and use of wild game for food. It is crucial here to recognize also how the constraints, policies and contracts discussed above will influence or define both **consumer and provider behavior** by influencing, limiting and/or negotiating the service's viability (Figure 2.2). Consumer-provider interactions are also characterized by their results or **real world effects**. Not only should this be represented by the systemic influence the consumption has on the consumer, but it should also reflect resultant ecosystem services that consumption spawns. If consumption of an ecosystem service results in the creation of greenhouse gasses, for instance, then one real world effect would be global warming.

### *2.4.4 Execution Context*

A service's **execution context** (Figure 2.3) differs from the rest of the concepts in this prototype, in that it is the instance-specific representation of discrete provider-consumer interactions. The execution context describes the particular of the 'arrow' drawn between a service provider and service consumer. It provides a snapshot of all the

aforementioned factors as they manifest in real-world ecosystem service transactions, including the discrete observed outcomes associated with that transaction. It is perhaps the most important aspect of the SOA because ecosystem services can and are likely to be consumed in multiple ways at the same time, with differences in policies, contracts and behaviors leading to (sometimes remarkably) different real-world outcomes, outcomes that can influence existing or create new policies and contracts for services in the system at hand.

A service's execution context is also where that **type** information I mentioned earlier, i.e. whether a service is a supporting, provisioning, regulating or cultural service, comes into play. Service type is largely dependent on the point of view of the consumer, and the real world effect (again, landscapes providing 'inspirational' services or greenhouse gases as 'waste'). It is also possible that a single service transaction between provider and consumer actually has multiple types. A good example would be how moose provide both a provisioning service (food) to native Alaskans, as well as cultural services (identity, community, education). Also part of the execution context, are conditions specific to outcomes of the service's consumption. That is, whether the consumption of the service is subtractive or rivalrous. The provisioning service which moose provide native Alaskans, for example, is subtractive from the overall moose population, whereas cultural services are often non-subtractive or non-rivalrous, like oft-cited aesthetic benefits derived from viewing a landscape. The execution context and outcomes of service consumption, how they are relevant within a context of change and

how they reflect system vulnerabilities will be explored further in later sections of this paper.

## 2.5 USING THE SOA

I will re-emphasize that the SOA is not itself a model or framework, but a meta-framework for defining and elaborating the complex set of data embedded surrounding ecosystem services. This same framework can also be used to describe ecological interactions within ecosystems, which I explore in the following example.

### *2.5.1 Example 2: Soil Services*

Because the ecology of soil is relatively well understood, especially in terms of the services it provides, it makes for an excellent second example. From a social-ecological perspective, soil services are support services that regulate ecosystem processes (e.g. the nutrient cycle). But as virtually all land-based organisms depend in some way on soil (Daily and others 1997), they can also be described in non-anthropocentric terms as the services that any of these organisms receive. This section will categorize a handful of these services (by no means an exhaustive list) that soil provides, and will classify one of them using the SOA prototype. A couple of additional concepts from the services architecture will also be introduced along the way.

The choice of soil allows us to first revisit the issue of scale, especially the power of the SOA for scalar analysis. Soil is an aggregate, of micro- and macro-organisms, rock, humus, etc., and is itself more of a scalar or organizational concept than an actual

thing. Though the decomposition of organic waste is in fact a service provided by the thousands of organisms that make soil their home, soil as a scalar concept allows us to abstract those ultra-complex processes and consider it as the consumption of waste services provided it by animals and plants, and the delivery of nutrient, support and shelter services to plants and micro- and macro organisms. As such, some of the most commonly cited soil services are not actually services themselves, but suites of services (Figure 2.4), a bundle of services from one or more service providers that is collectively known by its real world effect, e.g. the nutrient cycle.

Tables 2.1 and 2.2 elaborates one service provided by soil, which I've decided to call the 'topsoil nutrient service.' This is a service consumed by plants, by which soils provide them carbon, nitrogen and water through physical contact with their root system. I've selected this service because it can be mediated through processes which do or do not involve human interaction, but taken from another point of view I might have chosen to make topsoil a service consumer of the other members in the water and nutrient cycling systems. The intent of this exercise is to show how easily the framework accommodates both biologically and culturally imposed realities in the same context, for example how in section 1.2 the soil's exchange capacity (a physical limitation) and soil conservation policies (an imposed limitation) are listed side-by-side. A similar example of this is how the service's 'reachability' is influenced by physical limitations to seed dispersal, which in a rangeland system is driven by random chance events like grazing, wind, etc., but in an agricultural one is a function of land ownership and cultivation strategy (which are each themselves further influenced by economics and politics).

Here we also see the first example of a service's 'execution context,' which describes the particulars of a provider-consumer transaction. In Table 2.2, I chose to describe the topsoil service consumption within the context of industrial corn farming as deconstructed by Pollan (2006); the execution context brings the policies, contracts, behaviors and choices involved to the forefront when evaluating the real world effects of the transaction, in this case the decision to pursue high-output farming despite the policy of a limited soil capacity leads to the need for farmers to use fertilizers, with a real world effect of higher production costs, higher petroleum dependence, and further topsoil degradation. The context is also useful for exploring how the consumption of a service has changed over time, by comparing past, present (and future) ways the provider-consumer relationship has played out (i.e. for comparing the real-world effects of changes in policy and behaviors, and forecasting new real-world outcomes of projected and/or suggested changes in same).

## **2.6 SOA ANALYSIS AND SUSTAINABLE OUTCOMES**

Some of the details enumerated in Table 2.1 may seem obvious or self-evident (e.g. stating that the interface of soils is how nutrients collect on soil particles, or that physical contact with the root structure is necessary for water and nutrient transfer), but this is the result of the scope of the soil example. One can imagine how the 'interface' of a more complicated service, such as gaining a sense of cultural identity through the use of landscape and the pedagogy of an elder, *is* an important consideration. This second example takes the SOA prototype further using the Native Athabascan communities of

the interior Alaska Region known as the Yukon Flats. Though this example will by no means capture the entirety of the system, it will illustrate how the SOA functions as more than just a descriptive tool, as a way to explore a system's resilience and vulnerability, and to identify starting-points for capacity-building, sustainability-minded initiatives.

Even under the best conditions, Alaska's boreal forest can be hungry country for a hunter, and one can travel a long time on the Yukon River and sometimes still not find enough game to sustain a family for even a short period of time. The system worked in the past, however, when the seasonal distribution and wildlife abundance were more or less predictable, where planning accounted for alterations in abundance and shortage following a predictable if not always dependable schedule from year to year, and where people had unrestricted access to the land (Gerlach and others in press). Today, with people mostly geographically-fixed to communities, there is no guarantee that enough country food can be harvested to satisfy immediate needs of rural Alaskan communities, or that enough can be processed and put into storage to provide for food or nutritional security through long, northern winters. Access to these resources is even further confounded by a patchwork of land ownership and an institutional and regulatory framework that provides federal and state agencies with control over much of the land and most of the fish and game. Too, successful country food harvests must be well tuned with the flow of the seasons and hunters need good weather information to make the best decisions about where and when to hunt, but unexpected changes in ecosystems and weather make it more difficult for hunters to adapt and alter harvest strategies (ibid).

This challenge is being answered in communities by an increased reliance on store-bought foods, which provides these communities an measure of food security that was not enjoyed in the past but also increases vulnerability and undermines community health and self-reliance (Caulfield 2002; Duhaime 2002; Gerlach and others in press; Wilk 2006). Too, the quality of these imported foods and the quality of information about their nutrition and safety upon which these communities must now rely is often unreliable at best. Evidence of this include current epidemic trajectories of diabetes, heart and respiratory disease, language loss, pollution and the misuse of natural resources, malnutrition, alcoholism, poverty and crime, and are all too familiar to both the members of and scholars of rural Alaskan communities (e.g. Caulfield 2002; Duhaime 2002; Fleener and Thomas 2003; Gerlach and others in press; Graves 2004; Krupa 1999; Kuhnlein and others 2004).

To put this scenario in terms of the SOA, what I've described above is a crisis of **viability** created by the intersection of new and unpredictable **ecological constraints** with the current set of political, legal and economic **policies** and **contracts** that are in place. The ecological limits to viability of the country food harvest, e.g. changes to landscape, fire, migratory patterns and overall phenological variation, are compounded rather than mitigated by the policies and contracts of land management and wildlife management regimes. Rural Alaskan communities are increasingly faced with trade off decisions that meet their short term food security needs, such as the substitution of store-bought foods for less reliable country foods and the time spent earning wages instead of

time spent on the land. But these substitutions are proving to be far less perfect, however, through the syndromes discussed earlier.

### *2.6.1 Example 3: The Moose Meat Service*

I've elaborated the details of this (in part) using the SOA framework in Tables 2.3 and 2.4, in terms of a 'moose meat' service. Notice first how the structure accommodates this very different set of information, while still organizing it in a useful way. In building these tables I was forced to tease apart all of the interwoven influences on food security in the region, and as a result I now have a manageable typology for exploring the biophysical, social and cultural outcomes of the service, from a sense of belonging to the legal outcomes of hunting out of season, as well as some point-sources of vulnerability in the system.

Table 2.4 presents one out of many possible scenarios for the execution context of this service, an exercise that among other things has illuminated the trade-off decisions a resource user is faced with and their resultant outcomes, as well as how the current policy for ceremonial-purpose exemption to hunting limits – a policy that officials see as a concession and in the peoples' best interest – can sometimes work at counter purposes with its intent, resulting in waste rather than increased food security. I could have, however, taken the exercise even further by drafting an execution context for each different kind of stakeholder in Alaska, from subsistence user to tourist/sport hunter, and have a basis for comparing them all. Or, the same framework could be used to compare circumstances of the same hunter at various points in time, i.e. the turn of the century,

before and after Alaska statehood, today, and even into the future (based on some hypothetical or projected changes). Indeed the comparative ability does not end there; one could go so far as to generate an SOA analysis of moose, caribou, and reindeer uses for cross-cultural comparison throughout the Arctic, and look for solutions to the vulnerable points in one system, such as the crisis of viability discussed above, in the strengths of the others.

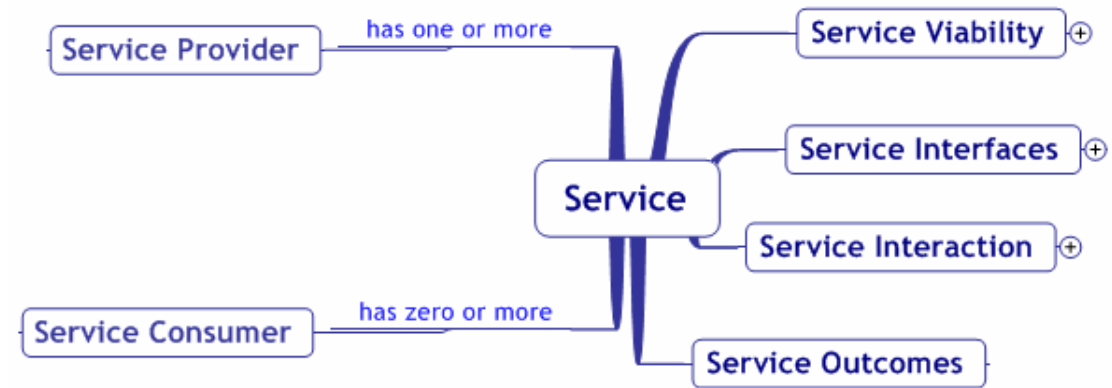
## 2.7 CONCLUSION

We know that we can no longer simply ask how much a functioning ecosystem is worth (Costanza and others 1997); indeed we must accept that a functioning ecosystem is a necessary part to a functioning social-ecological system, whose interrelatedness extends beyond simple market economics. When Costanza and his coauthors presented their concept of ecosystem service valuation, it was not as a new standard but as the stimulus for debate and discussion regarding the intersections between societies and nature (Costanza 1998); this essay is written with exactly the same sentiment as that seminal *Nature* piece: I do not present this as perfectly contrived, but as a prototype for social and physical scientists to tinker with in hopes that the disciplines will come together via a shared framework to create a functional way to understand, model, and benefit these infinitely complex linked systems. The framework should enable researchers and planners with a standardized toolkit for extending the MA's ecosystem services model, enhancing our analytical ability by drawing our attention to a system's functional relationships rather than its functional units. In concert with existing tools like flow charts

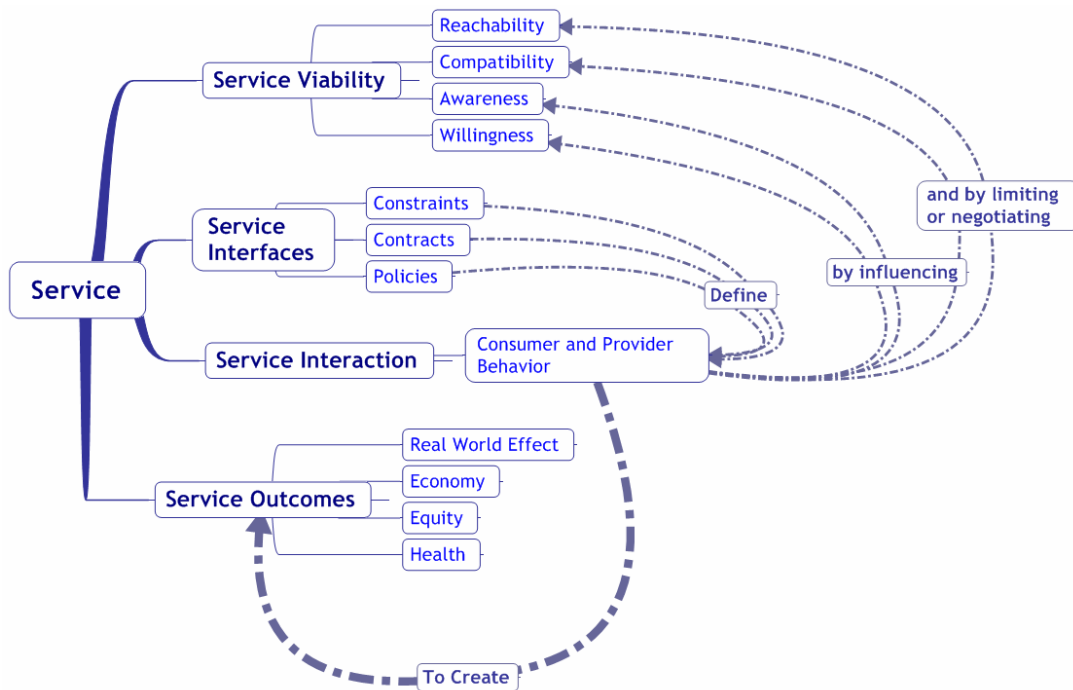
and causal-loop diagrams, the SOA perspective provides a way for analysts to better conceptualize complex human-nature relationships, predict the cascading effects of changes in human behavior, extinction events and other ecological crises, and to test the efficacy/viability of ecosystem substitutions.

The full power and flexibility of the SOA will be realized when the framework is used to model consumer-provider relationships from a number of points-of-view. The SOA offers standardization to the discussion of any ecological system, where it may be beneficial to discuss support and provisioning service consumption from the point of view of a polar bear, or of pollinators. Too, liberating ecosystem services from the perspective of human consumption allows for another consideration: that of people as contributors to ecosystems, not just consumers and polluters but capable of providing services of our own. With this new way of thinking about social-ecological systems, one that returns people to the role of participants in the natural world (and end to which I have presented the SOA as one small step towards), new potentialities for working towards sustainable and *integrated* social-ecological systems emerge.

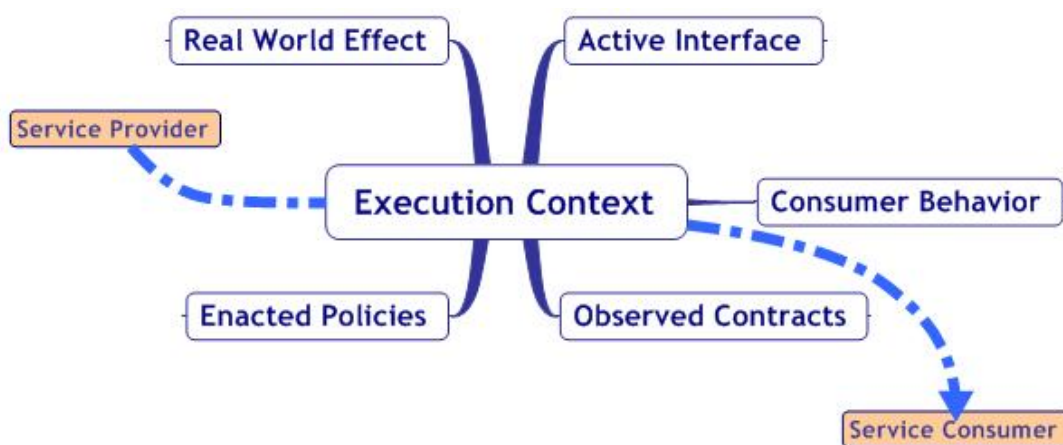
## 2.8 FIGURES



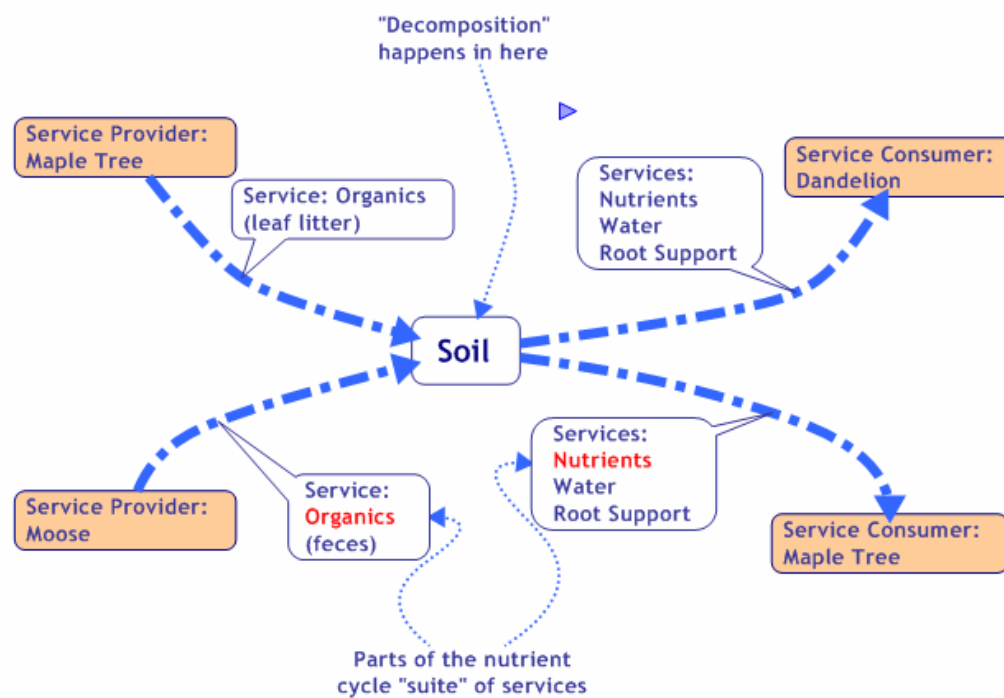
**Figure 2.1. Concepts of the SOA Prototype.** Top level concepts of the SOA prototype include its provider and consumer, as well as viability, interfaces, interaction and outcomes.



**Figure 2.2. Service Definition.** This shows how aspects of a service's definition influence other service aspects. Constraints, contracts and policies define consumer and provider behavior, by influencing awareness, willingness and compatibility, and by limiting and/or negotiating compatibility and reachability, to create service outcomes.



**Figure 2.3. Service Execution Context.** A Service Execution Context contains instance-specific data.



**Figure 2.4. Soil Services.** Illustration of some soil services and services suites.

## 2.9 TABLES

**Table 2.1. Soil Service.** A SOA-based service-meta-model for topsoil.

<b>Topsoil Nutrient Service</b>		
1. Definition	1.1 Description	Retention and delivery of nutrients to plants. See Daily and others 1997, pp. 119-127 for a good summary.
	1.2 Interfaces	Nutrients collect on surface of soil particles
2. Viability	2.1 Constraints	Physical limitations to the service. For example soil exchange capacity maximizes retention and density of service consumers.
	2.2 Policies	Topsoil conservation measures, land use restrictions (zoning)
	2.3 Contracts	Contracts influencing the consumption of this service. Carbon credits, soil conservation agreements, Contracts that influence behavior, and might result in intensified cropping, a rotational strategy, or a contract may be in place to halt cropping altogether.
	2.4 Compatability	Absorption via water
	2.5 Reachability	Physical contact (access): Seed dispersal (passive or active), Land Ownership
	2.6 Awareness	Farmers are aware of the soil
	2.7 Willingness	Farmers are willing to grow plants in soil, and participate in behavior necessary to grow plants in soil (see 3.1)
3. Sustainability	3.1 Behavior	“weak” soils may require fertilizers, amendments, tilling, etc.
	3.2 Real-world Effect	Nutrient cycling or soil depletion; plant growth

**Table 2.2. Soil Service Execution Context.** A scenario execution context for topsoil, informed by Pollan (2006). Here the farmer has made a decision to participate in the dominant agro-industrial model of corn production, despite the immediate outcomes like depleted soil and further dependence on non-renewable energy sources.

<b>Execution Context: Industrial Corn Field</b>	
Provider	Topsoil of corn field
Consumer	Corn plant
Service Type	Provisioning: Subtractive, Rivalrous
Active Interface	Water
Constraints	Depleted soil has a limited exchange capacity
Policies enforced	The global agro-economy sets pricing (value) of corn. Corporations which provide seed & other supplies to farmers require annual purchase of materials.
Contracts observed	US Government Subsidies create an economic environment where incentives are provided to ignore ecological constraints
Consumer Behavior	Farmers maintain practice of heavy growth They use extensive fertilizers, and purchase high-output GMO corn
Real-World Outcome	High cost, high output corn farming, with extensive topsoil degradation. GMO foods with questionable safety and nutrition saturate the market. Farmers must supplement farm income with second jobs to make a living. Small farmers are outcompeted by large farm outputs, or look to find new crop/market (i.e. organics).

**Table 2.3. Moose Meat Service.** An SOA analysis of the services provided by moose meat in Alaska, including the physical, political, social, cultural and economic aspects of the services use. This service is an example of vulnerability rooted in the accumulation of obstacles to the service's viability.

<b>Moose Meat Service</b>		
1. Definition	1.1 Description	Provides food (energy) to humans and other predators
	1.2 Interfaces	Hunting
2. Viability	2.1 Constraints	Birth rate, predator competition, and compensatory mortality all contribute to a population's maximum sustainable yield.
	2.2 Policies	<ul style="list-style-type: none"> <li>- State and federal policies may limit take or access</li> <li>- Social and cultural institutions may dictate/limit takes, or require takes at certain times for ceremonial reasons.</li> </ul>
	2.3 Contracts	The state department, for example, gives 'tags' to hunters on a first come or lottery basis. Hunters agree to this number. Contracts for moose management can also exist between agencies and tribal corporations for moose management, access to state/federal land, etc.
	2.4 Compatibility	Effective source of digestible protein - 100g/pound (after cooking)
	2.5 Reachability	<p>Must have access to moose habitat and be able to hunt them.</p> <ul style="list-style-type: none"> <li>-Access can be limited by changes in weather, landscape, fire, legislation, land-ownership</li> <li>-Ability includes time &amp; resources, for instance if the hunters' circumstances influence them to take a wage-earning job during hunting season, or if they cannot afford gasoline to power their snowmobile.</li> </ul>
	2.6 Awareness	Must have local knowledge as to harvest areas, wildlife movement, and must have the appropriate hunting skills.
	2.7 Willingness	<p>Must be willing to kill and eat moose, versus choosing an alternative source of calories and nutrition.</p> <p>Also must be willing to observe policies and enter into appropriate contracts with resource managers and land owners (or be willing to accept the consequences of not doing so)</p>
3. Sustainability	3.1 Behavior	<ul style="list-style-type: none"> <li>- Ritual may dictate certain procedures before / during / after the hunt.</li> <li>- Hunters must obtain license from state authority, and must stand in line for the right to X number of kills.</li> </ul>
	3.2 Real-world Effect	Moose hunting can provide a household with a surplus of edible meat, when appropriate drying/storage measures are taken

**Table 2.4. Moose Meat Execution Context.** One possible execution context for the moose meat service.

Notice how the hunter has to make decisions driven in part by ecological constraints but also by constraints levied through policy and contract, and ultimately must make a trade-off decision about breaking the law to achieve food security.

<b>Execution Context Scenario</b>	
Provider	Moose
Consumer	Native Alaskan Family
Service Type(s)	-Provisioning: Subtractive and rivalrous. -Cultural: Identity, community, spiritual. These are non-subtractive, non-rivalrous
Active Interface	Hunting
Constraints	Size of moose population; migration patterns, changes in terrain, snow cover
Policies enforced	ADF&G enforces policies shortening the legal hunting season in response to what are considered low moose populations. Land ownership or land management regimes allow and restrict access to prime hunting areas.
Contracts observed	Hunter receives tag to take only 1 moose, through a lottery or by standing in line at the start of season.
Consumer Behavior	Hunters stand in line to receive their hunting tags, but may or may not observe the hunting limits based on need.
Real World Effect	- Hunters is not able to meet most of their nutritional and ceremonial needs via moose, hindered by regulation, sparse population, or changes in weather. - Hunter is caught hunting outside the season, and must prove 'ceremonial use' to avoid costly fines. The so-called ceremonial use requires that a potlatch ceremony be thrown and the moose meat consumed, not preserved/stored.

## 2.10 REFERENCES

- Caulfield R. 2002. Food Security in Arctic Alaska: A Preliminary Assessment. In: Duhaime G, editor. Sustainable Food Security in the Arctic. Alberta: CCI Press.
- Costanza R. 1998. The Value of Ecosystem Services. *Ecological Economics* 25(1):1-2.
- Costanza R, d'Arge R, de Groot R, Farber S, Grasso M, Hannon B, Naeem S, Limburg K, Paruelo J, O'Neill RV and others. 1997. The Value of the World's Ecosystem Services and Natural Capital. *Nature* 387:253-260.
- Daily GC. 1997. What Are Ecosystem Services? In: Daily GC, editor. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington, D.C.: Island Press. p 1-10.
- Daily GC, Matson PA, Vitousek PM. 1997. Ecosystem Services Supplied by Soil. In: Daily GC, editor. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington D.C.: Island Press.
- Duhaime G, editor. 2002. Sustainable Food Security in the Arctic. Alberta: CCI Press.
- Fleener C, Thomas B. 2003. Yukon Flats Salmon Traditional Knowledge. Fort Yukon: Council of Athabaskan Tribal Governments, Natural Resources Department. Report nr CATGNR 03-03. 36 p.
- Gerlach SC, Turner AM, Henry L, Loring P, Fleener C. in press. Regional Foods, Food Systems, Security and Risk in Rural Alaska. In: Duffy LK, Erickson K, editors. *Circumpolar Environmental Science: Current Issues in Resources, Health and Policy*. Fairbanks: University of Alaska Press.
- Graves K. 2004. Resilience and Adaptation among Alaska Native Men: Abstract. *International Journal of Circumpolar Health* 63(1):2004.
- Krupa DJ. 1999. Finding the Feather: Peter John and the Reverse Anthropology of the White Man Way. Madison: University of Wisconsin, Madison. 315 p.
- Kuhnlein HV, Receveur O, Soueida R, Egeland GM. 2004. Arctic Indigenous Peoples Experience the Nutrition Transition with Changing Dietary Patterns and Obesity. *Journal of Nutrition* 134(6):1447-1453.
- MacKenzie CM, Laskey K, McCabe F, Brown PF, Metz R. 2006. Reference Model for Service Oriented Architecture 1.0. OASIS.
- MEA. 2005. Ecosystems and Human Well-Being: Synthesis. Washington D.C.: Millenium Ecosystem Assesment.

Pollan M. 2006. *The Omnivore's Dilemma: A Natural History of Four Meals*. New York: The Penguin Press.

Wilk R, editor. 2006. *Fast Food / Slow Food: The Cultural Economy of the Global Food System*. Lanham: AltaMira Press.

## CHAPTER 3

### **Coming out of the Foodshed: Food Security, Nutritional, Psychological and Cultural Well-being in a Context of Global Change: the Case of Minto, AK.<sup>14</sup>**

#### **3.1 ABSTRACT**

Kloppenborg et al. (1996) gave us an evocative blueprint for local, healthful food systems through the foodshed metaphor. The metaphor is equally as useful in reverse, for describing the trajectory of any community whose existing local foodways are fragmenting, being supplanted and/or replaced by increased participation in the global food system. In this paper I discuss one such example of this ‘coming out of the foodshed’ process: the Native village of Minto, Alaska. In particular this paper discusses both the harvest of country foods as practiced by this community, as well as the circumstances of the whole rural Alaskan food system, particularly within a context of global environmental, social and political change. The goal of this exercise is to look at how local foodways in Minto that traditionally link food, nutrition, and community health through ecology and culture, are being replaced by participation in a different system where food (calories) may seem more secure but nutrition, physical, psychological and cultural health are not.

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<sup>14</sup> Loring, P.A. and S.C. Gerlach. In Preparation. Agriculture and Human Values

### 3.2 INTRODUCTION

*That country, all you see, the animals, plants, everything. We live on that. Now it's all taminated. I seen so much change. Fire. Earthquake. Mining. The lakes dry up. You're a white man. Do it mean anything to you?*

--Peter John, Traditional Chief of Minto (quoted in Krupa 1999).

It has been to my great fortune to be accepted as researcher by the people of Minto, Alaska, including especially my friend Chief Patrick Smith. I learned so very much from him and his community about the importance to one's well-being of things like tradition, family, spirituality, and self-sufficiency. Unfortunately, these messages were shared with me at a time when the community was itself struggling to maintain these aspects of their own lives. Many community members, especially the elders but also adults and even some well-spoken youngsters, lament their slow trajectory away from many of the keystones of what they call their 'traditional' ways of life, such as respect for and time spent on the land, with elders, and the continued use of country foods. But they also share more immediate concerns for their physical well-being: confronted by changes in ecosystems, climate, politics and the global economy that have direct ramifications for their ability to access and make use of local resources, thereby compromising their food and nutritional security. In response, they are often forced to choose strategies that answer these short-term challenges but create long-term problems in return. And though their social, psychological, cultural, physical and ecological well-

being seem intuitively to be inexorably intertwined, the people of Minto, like so many other Native Alaskan communities, are in fact caught making trade-offs between them.

Today, the diets of rural Alaskan communities like Minto are in transition; country foods (those harvested from the land, often called subsistence foods) share an increasing partnership with store-bought foods, which provides these communities an additional measure of food security but also increases vulnerability and undermines community self-reliance (Caulfield 2002; Duhaime 2002; Gerlach and others in press; Wilk 2006). This paper uses the foodshed metaphor to re-examine the food system change in Minto as documented by Reed (1995) and to tease apart the circumstances that bring these tradeoff situations to bear (after Kloppenburg and others 1996). The foodshed is derived from the ecological concept of the watershed: a geographic context for the flow of water through a landscape and into communities. It is intended to serve similarly as a geographic context for discussing the movement of food, through the processes of harvest, preparation, storage and consumption, at individual, community and regional levels. There is a normative distinction made between foodsheds and a global food system: a proper foodshed is said to respect the integrity and proximity of particular socio-geographic spaces, where the procurers, preparers and consumers of food are linked not just by economy but by community, where landscape is understood to be a part of that community, and where human activities therefore conform with local knowledge and experiences of what that landscape can and can not provide. The notion of a global foodshed is therefore an oxymoron. Embedded in this differentiation is the hypothesis that whereas the global system is destructive to the integrity of the ecological and social

landscapes, a foodshed espouses a moral economy and “commensal community,” one that eats together and with respect for the lands upon which they subsist.

The research I present here speaks directly to that hypothesis. Contrary to the relatively optimistic view presented by Reed, Minto is experiencing the destructive process of “coming *out* of its foodshed:” a process where exogenous economic, political and ecological drivers are motivating the gradual release of local control over the food system, and prompting choices that distance the people, both geographically as well as psychologically, from the land, from safe and healthy food, and from each other. Thus, the economy of life for this community is transitioning in a direction opposite that described in the original foodshed paper: from a moral economy which involves obligations of mutuality, reciprocity and equity, to one dominated instead by the exogenous forces of a global market economy and plagued by the vagaries and vulnerabilities participation in a global market brings (Gerlach and others in press). But in my time with the people of Minto I also perceived a countercurrent to this trajectory; as I was learning my own lessons about tradition, self-reliance, and faith, I was also witnessing the emergence of a movement of cultural renewal founded upon their unique style of Christian faith, and driven by a desire to find a way to both participate in the greater contemporary Alaskan community and to remain *Mhenti*: the people “of the lakes.” This paper will conclude, therefore, with a note on how the community is and might continue to regain local control of their foodshed and therefore their self reliance.

### **3.3 METHODS**

This paper brings together ideas that developed over the course of two years of research into rural Alaska food systems, and several weeks during that two-year period spent as a participant-observer with members of the Minto community. My arguments build upon and are informed by the extensive background information on Minto and other Interior Alaskan food systems, as provided by the community itself and as compiled by Andrews (1988; 1985), Caulfield (1983), Krupa (1999), Olson (1968), and Reed (1995), among others. In many cases, I will reference ‘informant(s)’ of my research, which should be taken to indicate that the statement of fact is taken directly from one or more anonymous interviews or surveys. No informant is quoted here without their permission, nor are they identified by name, as making reference to a particular person or events in these terms (especially in respect to abstract discussions of the future,) borders on taboo. Any other statements of fact I make that is not attributed to informants or cited to some external source represents a synthesis of observations made over the research period, though where necessary I have sought out additional references from literature (and cited them appropriately) to support these claims. Needless to say, these syntheses (and any errors in judgment or logic that follows from them) are my own.

### **3.4 MINTO, AK AND THE MINTO FLATS FOODSHED**

Minto is a community of roughly 200 people or 50 households, mostly descendants of the Lower Tanana Athabascan Indians, located on the west bank of the Tolovana River 130 miles northwest of Fairbanks (approximately 65.153330° North Latitude and -

149.336940° West Longitude) (Figure 1). The village of Minto is in the western-most portion of historic Tanana Athabascan territory. During the late 1800s, the Minto band occupied much of the lower interior region of Alaska, but traveled seasonally as far north as the Brooks Range and Yukon River flats for trade and as a part of their gathering and hunting activities (Figures 2 and 3). The village is now 40 miles north of the originally settled location (“Old Minto”), on higher grounds that had been used traditionally as a fall and winter camp since at least the early 1900s<sup>15</sup>. Old Minto first became a permanent settlement when some members of the Minto band built log cabins there, on the bank of the Tanana River, with other families choosing to live there in tents on a seasonal basis. The Minto band was eventually joined by bands from throughout the Tanana area, including Chena, Nenana, Toklat and Crossjacket Athabascans (AKDEC 2006; Slaby 1981). The community chose to move from there in 1969 due to repeated flooding and worries of erosion, but ironically the old location has held up rather well since. Today the village council is comprised of four tribes: *Bedzeyhti* (Caribou tail), *Ch’echalyu* (Salmon tail), *Tsiyhyu* (Red clay paint), and *Tonidra Gheltsilna* (Eagle, or the middle tribe). The Eagle tribe is also considered the ‘middle’ or peacemaking tribe as they have historically been able to diffuse social tensions amongst the new neighbors (Krupa 1999).

Access to urban services in most Alaskan ‘bush’ communities is limited logistically to river and air transport, but Minto’s circumstances are inverted in this respect; no barge service is possible via the Tolovana River, because the waters are too

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<sup>15</sup> Dr. Michael Krauss of the Alaska Native Language Center reports that the site of “New” Minto is ironically more deserving of the “old” epithet, as it is a much older site of seasonal occupation than “Old” Minto.

shallow, but Minto is on the road system, accessible from the city of Fairbanks by the Elliott Highway, a now mostly-paved and well-maintained 118-mile drive. Residents have, despite the high costs of fuel and the rough and long drive (2 ½ dusty hours on a good day in the summer and 4 harrowing hours in the middle of winter), come to rely on bi-monthly trips to Fairbanks for provisioning. In some cases informal coops have developed between families where one shopper will procure supplies (i.e. groceries) for several households. Families purchase a wide variety of foodstuffs on these trips, much in line with the purchasing patterns of other areas of the United States (Reed 1995). Nevertheless locally harvested country foods, including fish and game such as salmon, whitefish, moose, black bear, beaver, ptarmigan and waterfowl, and botanical resources such as berries, rhubarb and rosehips, remain the most important part of the local foodshed. Fall activities are dominated by the moose hunt, and most still travel to fish camps each summer: seasonally used fishing and trapping areas on the Tanana River and Goldstream Creek (Figures 2 & 3). Indeed harvested lands today remain remarkably similar to those utilities at the turn of the 20<sup>th</sup> century, when the fishwheel (Figure 6) was adopted and the dominant focus of fishing activities changed from whitefish to salmon, allowing a more consistent land tenure in the lower Tanana River area (Slaby 1981).

These lands, of Minto and the surrounding ‘Minto Flats’ area, encompass 2,500 square miles of sub-arctic grasslands and wetlands, are drained by 5 major streams (the Tolovana, Chatanika and Tatalina rivers, and Goldstream and Washington creeks, see Figures 1-3), surrounded by mountain ranges of 3,000 to 4,000 feet, and as mentioned are rich riparian wildlife habitat (AKDEC 2006; Andrews 1988; Krupa 1999; Shepherd

1987; Village Council 1983). Minto is a rare case where the community<sup>16</sup> has (very recently) been able to purchase title to some 120+ square miles of the wetlands contiguous to the village-proper, yet this land holding seem meagers when compared to the range of lands traditionally traveled by its hunters. Movement on and across this landscape is fundamental to the feasibility of Native Alaskan adaptive strategies, but today the logistics of travel across these harvest areas is complicated and brings external forces to bear on even this local aspect of the foodshed. Mobility is linked to the purchase and maintenance costs of transportation technologies (i.e. ATVs and gasoline), made unpredictable by new ecological changes in land cover and forest fire regimes, and further constrained by a patchwork of land ownership (Figure 4) and an institutional and regulatory framework that puts federal and state agencies in a position to legislate control over much of the landscape (Gerlach and others in press; Juday and others 1998; Krupnik and Jolly 2002; Nationalatlas.gov 2003; Norris 2002). Within the last two decades but most intensely within the last two or three years, significant changes have been observed in the distribution, availability and migration patterns of harvested resources such as moose, ducks and fish. Particulars of these downscale, synergistic impacts of global climate change, land development and resource extraction in Alaska's interior remain poorly understood, though weather and wildlife patterns are without a doubt changing (Shepherd 1987). Hunters cite observations that match with the anticipated phenology of climate change: including the shifting of seasons, time of and time between freeze-up and break-up, lower water levels on the rivers, and new distributions of plants and insects. All

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<sup>16</sup> The community itself did not make this purchase, rather the community's non-profit corporation, the 'Seth-do-ya-ah Corporation' holds the title.

of these have severe logistical implications for the success of the country food harvest, as successful subsistence harvests must be well tuned with the flow of the seasons.

### *3.4.1 Subsistence: The Legislative Geography of Native Life in Alaska*

Subsistence: Resource dependence that is primarily outside the cash sector of the economy. This term has a specific application in laws relating to Alaska wildlife, but has eluded a comprehensive definition. To indigenous peoples it describes their culture and their relationship to the land, and thus the economic definition seems inadequate (see Berger, 1985). To others, subsistence no longer exists in Alaska because the cash economy appears to predominate throughout the state, so that no one is truly dependent upon the land. (Huntington 1992:15-16)

*Subsistence is a word. You know, a word you use to describe a way of life, our life. Though it doesn't do a very good job. We used to live off the land but now we live off of subsistence. Do you know what I mean? I mean we used to live on our luck<sup>17</sup>, what the land gave us. But now we supposed to live on what the subsistence rules says we can have. Supposed to be better that way. We just want to be left alone.* Anonymous Alaska Native speaker at the 2007 Alaska Forum on the Environment

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<sup>17</sup> The Athabascan concept of 'luck' is complicated, and has to do with how success in living on the land comes best to those who 'receive' what the land has to offer, rather than to constantly 'wish' for the things they believe they need. This is related to the taboo *enje*, which warns against the speaking of / predicting future events (Krupa 1999).

I have presented an overview of the contemporary geographic, social and ecological considerations of the Minto foodshed, but to understand the forces *deconstructing* the Minto foodshed requires also a review of the unique legal context within which Alaska Native communities operate. According to the current State of Alaska resource management regime, the country food harvest, termed ‘subsistence activities’ are defined in law as the “customary and traditional use of wild, renewable, fish and wildlife resources for food and other non-commercial purposes” (Alaska Statute 16.05.940(33)). The ramification of this, as the Native gentleman is alluding to in the quote above, is that the local foodshed, which once functioned in a highly flexible manner and was mediated by complex ecological relationships between people and between people and the landscape, is now also mediated by the regulatory frameworks of state and federal resource management agencies that this law (and others like it) espouses (Huntington 1992).

The origins of this legislation are in the Alaska Native Claims Settlement Act (ANCSA), which in 1971 created thirteen regional and local Native corporations with an economic and entitlement approach that differed significantly from the reservation and tribal model of the lower 48 states and parts of Canada. Through ANCSA, Alaska Natives received designated land and money as part of a land exchange to be divided among the state and federal government; these corporations were paid \$962.5 million, and allowed to select forty-four million acres of land (Alaska is roughly 375 million acres in size) as compensation for the “extinguishment of their aboriginal title” (Case 1984;

Mitchell 2003). ANCSA failed to take formal action on rights protecting the access to and use for subsistence purposes of the lands forfeited in the deal. In response, the U.S. Congress passed the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, attempting to return some level of subsistence rights to Alaska Native people, establishing the eligibility for subsistence priority in resource management decisions with three criteria:“(1) customary and direct dependence upon the populations as the mainstay of livelihood; (2) local residency; and (3) the availability of alternative resources” (ANILCA, PL96-847 S804). Further, ANILCA defines subsistence use as:

Customary and traditional uses by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non edible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade. (ANILCA, PL 96-847 S803)

The timeline for what is and is not customary and traditional, however, is often fixed at 1971<sup>18</sup> – the year of the passage of ANCSA. The country food harvest has therefore been temporally fixed, extracted from the remainder of local life ways and placed into an artificial category that is reified by law and by the perceived need for ‘resource’ management. Alaskan Natives did not in the past divide their daily activities along lines that are clearly defined as modern or traditional, “for subsistence” or otherwise; they simply did what was necessary to make a living for themselves and their

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<sup>18</sup> For example, the first chapter in *Alaska Subsistence: A National Park Service Management History* by Norris (2002) is titled “Alaska Native and Rural Lifeways Prior to 1971”

families, working on landscapes in and around their local communities. Today Native Alaskans do use the phrase, to describe some tangible thing outside of their community that needed to be protected; one community member told me that he supported my research because “they need to support anything that will be good for subsistence.” Many also project the category upon everything they consider traditional and “worth saving” about their community’s way of life (as suggested in the Huntington quote above), as ‘subsistence’ is perceived by many to be their most viable legal venue for asserting cultural legitimacy and authority. In practice however this has the danger of further reducing/restricting their cultural heritage within exogenous definitions that are in fact largely out of their control. The irony embedded in the latter part of the Huntington quote cannot be missed, then, in how a concept that was only recently brought into existence in the first place can also considered to have just recently disappeared, especially in respect to the power that the word has in the contemporary socio-political dialog.

### **3.5 “NEW” MINTO: COMING OUT OF THE FOODSHED**

*The foodshed can provide a place for us to ground ourselves in the biological and social realities of living on the land and from the land in a place that we can call home, a place to which we are or can become native.*

Kloppenburger et al.

“Coming into the Foodshed” 1996

Though the community has been at its present location for almost 40 years, many people continue to call their village “New” Minto. The epithet is prophetic in how it captures this contemporary transition within the community that many still correlate with the 1969 relocation and the later building of the spur road that connects the new community to the Elliot Highway (Krupa 1999; Reed 1995). Reed documented in great detail the Minto foodways in 1995, in a dissertation that serves as an exemplary “foodshed analysis” for the community. With an eye towards the ongoing processes of “culture contact” and “culture change,” the work concludes that the community had succeeded overall in keeping control over their foodways, managing the transformation of new, store-bought foods into local culture<sup>19</sup>, a process she labels as “innovation” (p 225). When I first went to Minto, it was to participate in a community garden initiative as an intern with the University of Alaska Fairbanks’ Cooperative Extension Service (CES), funded by a fellowship from the USDA’s Sustainable Agriculture Research and Education program (SARE). The project, it seemed, was an interesting new chapter of innovation in the story told by Reed, with lessons perhaps for other Alaskan communities. At first glance, local foodways seemed congruous with her characterizations, but the more I participated in local activities with Chief Patrick Smith, the clearer it became that the changes Reed observed as rather innocuous and under local control are in fact the result of a very confusing combination of largely exogenous forces, and that many of the decisions local people were making, though they seemed to best directly address their immediate needs, had significant long-term ramifications for

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<sup>19</sup> Though Reed does suggest that further research is necessary to monitor the potential negative health effects of new food and sedentary behavior (p220-224)

community vulnerability and well-being. The community, it seemed to me, was coming *out* of its foodshed.

The Minto Lodge, a 1980s-built hotel facility for which an impressive business plan was developed to promote the development of tourism in the industry, but is now mostly used as office space, continues to operate a restaurant that serves lunch to locals, often groups of elders, as well as the occasional passer-by<sup>20</sup> out of their large and well-equipped kitchen (Village Council 1983). On the menu is not native fare, however, but hamburgers, french fries, coconut shrimp, even a “McMinto” chicken sandwich. The restaurant is, they report, called upon from time to time to prepare traditional foods on the seldom occasion that they are donated. Instead, the freezers are most commonly stocked with frozen food-stuffs distributed by companies like Tyson and SysCo, and purchased in Fairbanks at stores such as Fred Meyers and Sam’s Club. Similarly, the only conspicuously local products found in the Minto store and gas station, amongst the shelves of familiar crackers, canned meats, candy and soda-pop, are t-shirts and ball-caps bearing the logo for the “*Seth-do-ya-ah* Corporation”, the village’s non-profit arm. Though a few in the community do grow their own gardens (two households in 2005), the volume they produce is too low to consider them a noteworthy part of the local diet.

This is not a criticism of the community, nor a canvassing statement that suggests changes to traditional foodways are always bad; indeed the constant alteration, adaptation

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<sup>20</sup> Though the Minto flats are a popular hunting destination, passers-by are seldom in the village proper regardless of the time of year; in fact it is quite impossible to actually *pass by*, as the road that leads to Minto is a 11-mile spur road that splits off of the Elliot Highway and dead-ends at the Minto convenience store. The one exception to this is during the periods of time the Alaska Department of Fish and Game agents are distributing licenses for the moose hunt; this event brings hunters from around the state camping out in line in the village.

and transformation of dietary patterns, e.g. the integration of new types of food, food processing and preparation methods, is assumed here to be an important aspect of adaptation that is characteristic of Athabascan life ways. Too, it is often the presence/influence of another culture's foodways that delineates the very boundaries of traditionality, and serves to further strengthen community ties and shared identity through a sense of belonging (Brown and Mussell 1985). Nor is the previous passage intended to suggest that country foods have been abandoned in Minto: much to the contrary wild fish and game are preferred in the villages, especially by Elders. But access to relatively cheap and consistent sources of imported foodstuffs undeniably provides communities like Minto a measure of food security that they did not enjoy prior to the 1970s.

Challenges for the modern subsistence hunter are different from those found even twenty or so years ago (Nuttall 2001); the most effective subsistence hunters today require boats, motors, and at times all-terrain or off-road vehicles, with costs measured in terms of high, purchase, maintenance and fuel prices. Hunters also need dependable access to country where traditional foods can be harvested in sufficient quantity to be consumed and shared among family and friends. Where economic and political conditions regulate how people hunt, where they go and how they get there, harvest success may be reduced and reliance on commercial food increased; so even with the continued preference for wild over market food reliance on industrial food in the rural diet is expanding. But these cheap foods (cheap not only in cost but also in nutritional value and cultural relevance) have also served to minimize the direct impacts of the increasing alienation between local foodways and state and federal resource management agencies mentioned earlier. Or to

put it another way, cheap food security has in fact subsidized this “coming out of the foodshed” process.

### *3.5.1 Proximity & Self-reliance*

As mentioned before, the foodshed is not just a geographic metaphor for studying food systems, but it also represents an ideal: a geographically, economically and morally “proximate” food system. Proximity is not just a simple matter of geographic locality or isolation, but of proximate control over matters of individual and community livelihood and well-being. To put it another way, proximity of control fosters self-reliance over self-sufficiency; “self-reliance implies the reduction of dependence on other places, but does not deny the desirability or necessity of external trade relationships” (Kloppenborg and others 1996:38). This self-reliance is also closely linked with social and ecological sustainability, in that a community that relies on its lands, its neighbors (and its neighbors’ lands), must therefore be concerned with matters of pollution, conservation and social welfare. Self-reliance is also a commonly used phrase and highly-valued notion among Athabascan communities and their definition is congruent with that presented in the foodshed paper. “Living well and responsibly with each other on the land” (p34) is considered as an accurate characterization of even the very recent past, that they simultaneously strive for and perceive as slipping away.

In communities like Minto, self-reliance is being grudgingly traded for reliance on external institutions, i.e. the job market and government welfare programs, and in particular by participation in the global cheap-food system, which creates both economic

and social distancing between the procurers and consumers of food and allows a further loss of control over food cost, supply, quality and suitability (Kloppenburger and others 1996; Pollan 2006; Sundkvist and others 2005). Consumers of this global system are also made less self-reliant in epistemological terms, in how they are “thought for” in respect to food choice, food quality nutrition and safety. Where the people of Minto’s traditional food choices and preferences were once driven by an understanding of food value that had developed over generations (Troger 2002), they now have to rely on FDA and/or USDA mandated labeling practices and New York Times best-selling diet books that present monolithic views of health that are neither sympathetic or reflective of the needs of locally adapted peoples (Nabhan 2004). This epistemological dimension is directly relevant to subsistence harvest practices too; hunters continue to rely on local knowledge, but fish and wildlife harvests are so heavily regulated and managed by outside agencies that subsistence hunting is forced into a secular rather than an integrated cultural framework. Where fish and wildlife populations were once managed through local knowledge, experience, and daily experimentation and observation, management is now based, among other things, on predator–prey models, carrying capacity, and with a battery of tools that probably focus more on the wildlife side than on the human side of the human-wildlife interactions management equation.

Too, these state and federal regulatory frameworks for subsistence activities described earlier are considered locally to be aggravating rather than assuaging the aforementioned downscale effects of climate change. Alaska Natives continue to experience difficulty with accessing traditional harvest areas and with collecting enough traditional

food to satisfy cultural tradition, to contribute significantly to the diet, and to promote or even maintain individual and community health. Despite the perceived changes in moose migratory behavior and season length, for instance, appropriate compensatory changes have not been made to the regulated moose hunting seasons (though a formal venue does exist to petition for hunting rights in special circumstances when food is particularly short). In combination with the fact that current interpretations of the Alaska state constitution prohibit the assignment of a ‘rural’ preference for wildlife resources (over urban and tourist hunters), regulatory frameworks do little in practice toward representing the needs of communities like Minto. The Minto Flats wildlife area is one of the most popular hunting spots in the state, and not just for local wildlife users but for sport hunters from around the state and nation. When moose ‘tags’ are distributed in Minto by the Alaska Department of Fish and Game (ADF&G), non-native hunters flock to the little community in their RVs to wait in line for the limited number of these permits. This “carnival,” as one resident described it, puts significant strain on Minto, in particular by creating direct competition for resources with a group of people who do not rely on said resources for their livelihoods. There are, in addition, important secondary impacts as well; the traffic puts extra strain on the one, mostly-dirt road into town, and non-resident hunters regularly bring alcohol into the community despite the fact that Minto is dry. Such behavior is indicative of the same overall lack of respect for community needs and the local environment that has led community members to post a sign (Figure 5) to visitors asking that they not waste the fish they catch.

### *3.5.2 Diversity & Flexibility*

Despite the fact that the harvest of country foods continues to represent the largest component of Minto's foodshed, flexibility and diversity in the use of fish and wildlife resources, are on the decline. In Alaska, this change is relatively recent, and linked to both contemporary environmental changes as well as the unresponsive legislative rigidity of the contemporary resource management regimes as mentioned above. This is especially troublesome because the freedom of flexibility and variety, often in the form of economic and dietary diversification, are key to maintaining local self-reliance in how they historically have provided resilience and adaptive capacity to these communities. Indeed, diversity and flexibility are in fact far more accurate characterizations of traditional Interior Athabaskan life strategies than is captured by the "traditional and customary" subsistence paradigm (Gerlach and others in press; see also chapter 1 in this volume). Consider the afore-mentioned transition from whitefish to salmon that occurred amongst the lower Tanana Athabascans at the turn of the 20<sup>th</sup> century. Athabascans of the Minto Flats region experimented with new fishing technology, particularly the fishweel, and harvesting lands further down the Tanana river. The first fishwheel built by this group in 1903 proved such a great success that in very short order the spring and summer activities and movement/settlement patterns of these people changed significantly. The efficiency and increased sedentism that the wheels supported was timely, considering emerging challenges to mobility on the landscape caused by the gold rush economy and continued immigration of Russian and Canadian settlers (Slaby 1981). Within the modern legislative context however, the freedom to change and innovate that allowed this group

to access new harvest lands and target a new species of fish, which many argue is required again if communities like Minto are to respond successfully to the down-scale impacts of global climate change (Anderson 1998; Folke and others 2003; Gerlach and others in press; Irvine and Kaplan 2001), is directly at odds with the static legislative regimes that give protection to only those activities recorded as “customary and traditional”.

### **3.6 IMPACTS ON PHYSICAL, PSYCHOLOGICAL AND CULTURAL WELL BEING**

Given that traditional foods, culture and health are so deeply intertwined, through history, ceremony, self-expression, tastes, taboos, etc., it is reasonable to expect that this “coming out of the foodshed” process will inflict upon people and their communities a significant amount of stress, both physical and psychological, as they struggle to reconcile these changes with their own notions of tradition and cultural identity. The many social institutions (e.g. tradition, kinship, and even a sense of belonging), that the ideal foodshed espouses and that contribute to the balance of individual and community well being, become increasingly vulnerable; gradually structures such as gender roles and other long-standing relationships of power and reciprocity can be destabilized by the new economic arrangements that emerge (Blue Spruce 1962; Douglas 1979:43; Graves 2003; Kloppenburg and others 1996; Krupa 1999). Too, the quality of these imported foods and the quality of information about their nutrition and safety upon which these communities must now rely is often unreliable at best. Evidence of this include current epidemic

trajectories of diabetes, heart and respiratory disease, language loss, pollution and the misuse of natural resources, malnutrition, alcoholism, poverty and crime, and are all too familiar to both the members of and scholars of communities like Minto (e.g. Caulfield 2002; Duhaime 2002; Fleener and Thomas 2003; Gerlach and others in press; Graves 2004; Krupa 1999; Kuhnlein and others 2004).

### *3.6.1 Nutrition & Physical Well Being*

The people of Minto clearly make a distinction made between subsistence-centered and non-subsistence-centered economic activities, and the proportional contributions of country foods to store-bought foods to the total diet are something of which they remain cognizant. Nevertheless, both the overall proportion and the diversity of country foods that contribute to diet in Minto as well as many other rural Alaskan communities continue to follow downward trends as the prevalence of eating from the store increases (Reed 1995). Researchers find that such a reduction in dietary diversity commonly occurs when hunting/gathering societies come in long-term contact with agricultural or industrialized populations, primarily by way of their effect upon the freedom and flexibility of local mobility patterns (Bryant and others 1985; Doughty 1979). This is a trend that holds up throughout much of Alaska, and poses real threats to physical well-being as the diversity of a country diet is generally considered to be far more healthful than the industrially-processed store bought alternatives (Grivetti and Ogle 2000; Kuhnlein and others 2002; Thorburn and others 1987). This “nutrition transition” coincides with near-epidemic rises in the prevalence of obesity, diabetes and

heart disease among Native Alaskan populations: diabetes, which was not thought to be present in Arctic and Subarctic populations in the past, now occurs for 18 out of 1,000 Alaska Natives, nearing levels of other developed countries, and cancer, heart disease, stroke, and cardiovascular disease have all similarly increased at these rates (ADHS 2000; ATSDR 2001; Broussard and others 1991; Egeland and others 1998; Kuhnlein and others 2004; Nobmann and others 1992).

As an example, it is known through a variety of ethnographic and anecdotal sources that native plants once played a significant role in both nutrition, medicine and as famine foods for Interior Alaskan communities, whereas today they are all-but absent from contemporary documentation of Native diets (except the berries, wild rhubarb, and rosehips) (Andre and Fehr 2002; Andrews 1988; Heller and Scott 1967; Holloway and Alexander 1990; Kari 1985; Nobmann and others 1992). One informant in Minto suggested that the decline in use is because tastes are different between the older and younger generations; that many of the children just don't like the taste of the plants that the elders still chew on from time to time. While this may be in part a result of the deterioration of traditional youth-elder pedagogical relationships, it is also well established that the flavors of store-bought, highly processed foods, especially those that contain monosodium-glutamate (MSG) or fructose derivatives (both of which have also been identified as contributing to the etiology of the ailments listed above) are much more intense than in natural foods, particularly in respect to sweetness. This has the effect of tricking our biophysical impulse to regard tasty food as healthful and nutritious (Bellisle 1998; 1999; Bray and others 2004; Hanover and White 1993). This allows them

to essentially out-compete, so to speak, both biophysically and psychologically, the natural, and often bitter flavors of local foods, making them seem to taste and smell “bad” or undesirable (Grivetti and Ogle 2000; Zandstra and Graaf 1998). Given that the senses of taste and smell wane with age, coupled with clinical studies that show these flavor enhancers are effective supplements for the elderly, further research is warranted into to the extent to which these additives are contributing to health epidemics as well as to the fragmentation of local foodways discussed here (Marie-Francoise and others 2001).

### *3.6.2 Cultural & Psychological Well Being*

Local foodways have been and continue to be the context for community social and cultural relations in Athabascan communities, so coming out of the foodshed has consequences to individual and community well being that reach beyond these physical syndromes and into the contemporary psychological and cultural challenges communities like Minto face. The harvest and consumption of wild foods contributes, for instance, to a sense of place and belonging to the country and community by connecting people in a physical and cultural way to the land through the use of travel routes, plant, animal, bird and fish harvest sites and areas, camps of modern and historical significance, etc. The land is the context within which world-view and identity develop when experienced, and a laboratory for exploration, experimentation and the development of local knowledge (Gragson and Blount 1999; Nabhan and Trimble 1994). Although the entire population of Minto participates to some extent in country food harvest activities, the actual proportion of time spent varies greatly among the generations. The older segment of the community,

mature adults and elders, have the means (e.g. supplies, cash) but not always the time (because of conflict with employment) or legal authority (because of state and federal subsistence regulations); still, this group participates more than any other. Young people in general no longer engage with the country in the same way that Alaska Native Elders do (Louv 2006; Nabhan and Trimble 1994), sometimes because of opportunity or financial constraints, a lack of interest, lack of significant contact with Elders, a sedentary lifestyle, all to some extent driven or subsidized by the increased participation in a global food system. Informants often spoke to me regretfully of the ‘village kids:’ children who spend most/all of their time in the village itself and eating from the store, no time spent with their adults and/or elders participating and learning customary survival skills, stories, songs and other traditions.

New research is illuminating direct cause and effect relationships between these cultural aspects of fragmentation and contemporary psychological and social syndromes. Like many Native communities in Alaska, Minto is a “dry” village but alcohol abuse persists there as a problem. In fact the camp at Old Minto is now used as a cultural rehabilitation camp for alcoholism by Natives from all over the state. In a recent pan-Alaskan study by Graves (2003), in which data from the incomplete “Social Transitions in the North” (McNabb, Richards, et. al 1993-1995) project were combined with additional new follow-up survey materials, disruptions to the participation in traditional country food harvest activities were linked directly to contemporary issues of psychological health (Graves 2003; 2004). The ongoing “social and environmental transitions” associated with the coming out of the foodshed process have been found to

be particularly devastating for Native men. Losing control over the rights and responsibilities associated with hunting, fishing and gathering has proven to destabilize gender roles as well as men's perception of their overall position within their families and community. These manifest as alienation, depression, and alcoholism, all widely recognized as significant contemporary challenges Alaska Natives and indeed Native Americans and other indigenous populations worldwide, with outcomes which threaten not only psychological and cultural well-being, but physical health as well.

### **3.7 DISCUSSION**

The dominant dynamics of the global food system actively erode both moral economy and community. We agree with those who believe that this destructiveness is an inherent property of that system, and that what is needed is fundamental transformation rather than simple reform. (Kloppenborg and others 1996:37)

Minto remains an excellent example of the “commensal” community, where people live and eat together in a manner that is respectful of each other, of the land and the environment, and built upon a moral economy where food is considered more than a commodity to be exchanged through a set of impersonal market relationships, and held as central to community well being. In this and in other respects, the people of Minto are still living mostly within their own foodshed. The details of Reed's inventory of food in the community remain accurate, but the dramatic differences between her optimistic view of the community's trajectory of food-system change and the reality I experienced 10

years later, are sobering. What I've presented here is my best attempt to capture the synergistic and cross-scale relationships and circumstances that are contributing to the fragmentation of Minto's local foodways. Indeed there can be no doubt that:

1. Access to country foods is being confounded by ecological, political and economic forces that are largely outside of the community purview
2. Rather than meeting these challenges head-on, country foods are being replaced by store-bought foods
3. Despite this additional measure of food security, nutritional needs are not being met by this contemporary, mixed diet
4. The transmission of local life ways through traditional lines of (elder-youth) pedagogy have fractured
5. A myriad of physical, psychological and cultural stresses are resulting from this process, including depression, alcoholism, obesity, language loss, and so on.

The process has created for itself a sort of positive feedback loop, whereby the progressive loss of knowledge of the landscape in "village kids," and increased unpredictability of weather and animal migrations, allow the importance of country foods to wane and cheap foods to increase. This in turn makes it less necessary in the short-term to develop new adaptive strategies to climate change or to fight for changed legislation in respect to subsistence regulation. Wage-earning becomes a more important enterprise so that the increased need of cheap foods can met, which in turn takes more

away from the survival of local knowledge via reduced time spent on the land with elders and with youth.

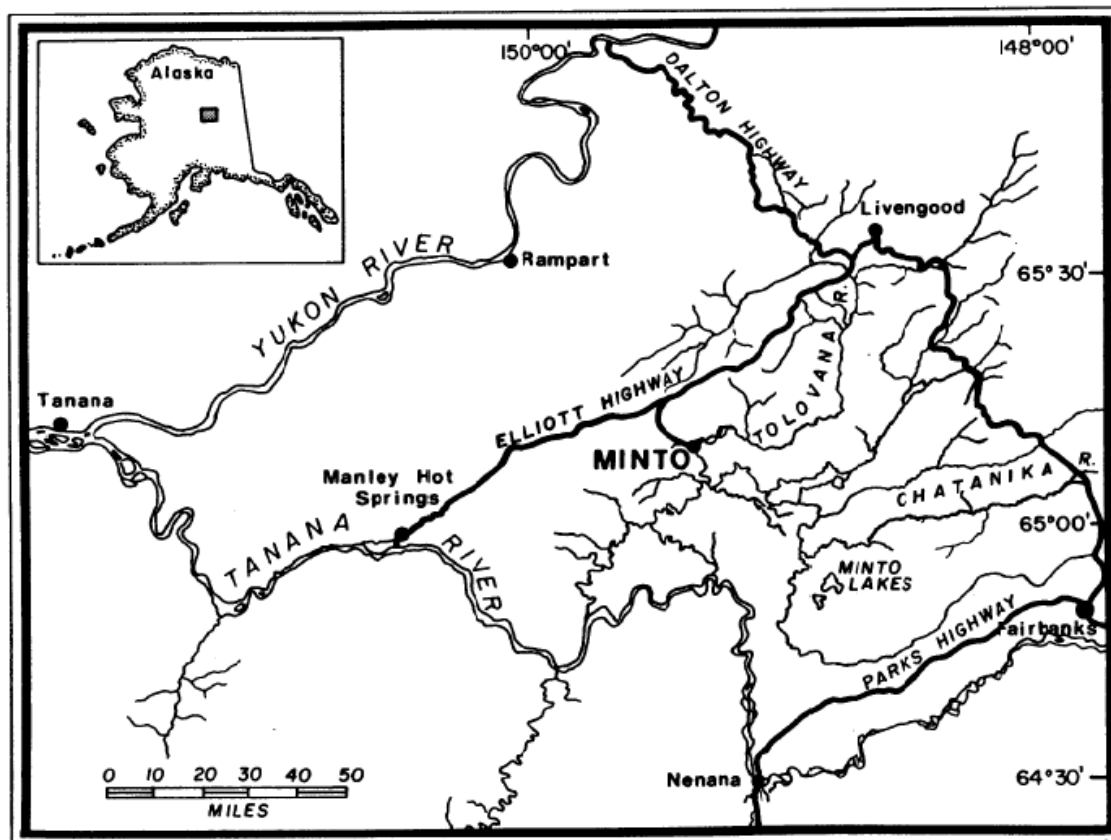
Fortunately, Minto is not merely a passive recipient of these changes, and they are very much in a position to reverse this trajectory of change without the need for the magnitude of reform spoken of in the quote above; values such as the importance of self-reliance, and the ability to adapt, innovate, and “think like a mountain” that Aldo Leopold suggests (as quoted in Kloppenburg et al.), are already well embedded within the Athabascan worldview (Krupa 1999). Nevertheless given the seemingly intractable nature of the exogenous forces driving these changes in Minto, measures of “self-protection, secession and succession” (Kloppenburg and others 1996:37) continue to represent the best courses for local action. Graves’ work, along with the successes of the cultural rehabilitation camp at Old Minto, exemplifies how a strong reliance upon cultural values such as “subsistence, responsibility to the tribe, respect for the land, and honoring elders” can be mechanisms of self-protection (Graves 2004:94). People in Minto also speak regularly at public gatherings and potlatches of the importance of regaining their self-reliance, and of making choices that take small steps toward reinvigorating local foodways, the same sort of choices of secession and succession that the foodshed paper prescribes. This small-scale activism is also bolstered by their strong religious convictions, which considers their Athabascan heritage as a gift or blessing from God; therefore protecting these traditions by enacting them and passing them on to the young are both considered to be in themselves acts of worship. Even the community garden initiative that was my original reason for visiting Minto is an example of one

innovative attempt to restore of a customary practice that dates at least to the 1930s (Olson 1981; see also chapter 1)), and facilitate the slow withdrawal from their cheap-food addiction.

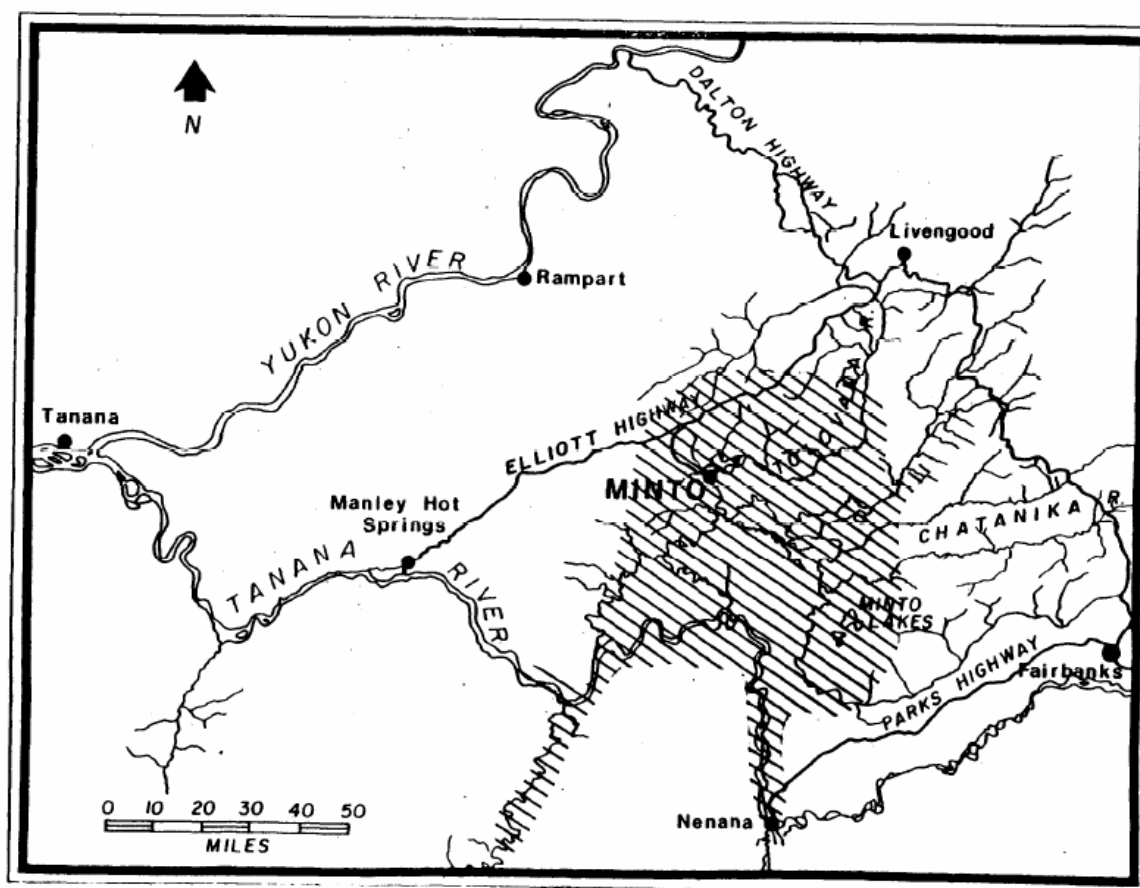
### **3.8 CONCLUSION**

The applicability to the case of Minto of this ‘reverse’ foodshed metaphor goes not only towards a better understanding of the case itself, but also towards certifying the legitimacy of the foodshed as a conceptual tool and as a design for action. Minto in many ways continues to display the characteristics and benefits of a healthful foodshed; but the contemporary syndromes that are emerging with its fragmentation are likely to find correlations in case-studies elsewhere. Finally, it also suggests a very positive outlook for the outcomes communities might enjoy as they move towards establishing foodsheds of their own. In Minto’s past and present are tangible, concrete examples of how communities that eat together and strive together towards greater self-reliance can indeed create a moral economy that is antithetical to a dominant system which has alienated people from each other and from the land. This process is not, however, be it for Minto or for any other community, simply one of turning back the clock. Restoration of those things which used to work in the past must be steered with the necessary innovation and experimentation in mind to discover those new approaches that can meet the new challenges of the present and the unknown challenges of the future.

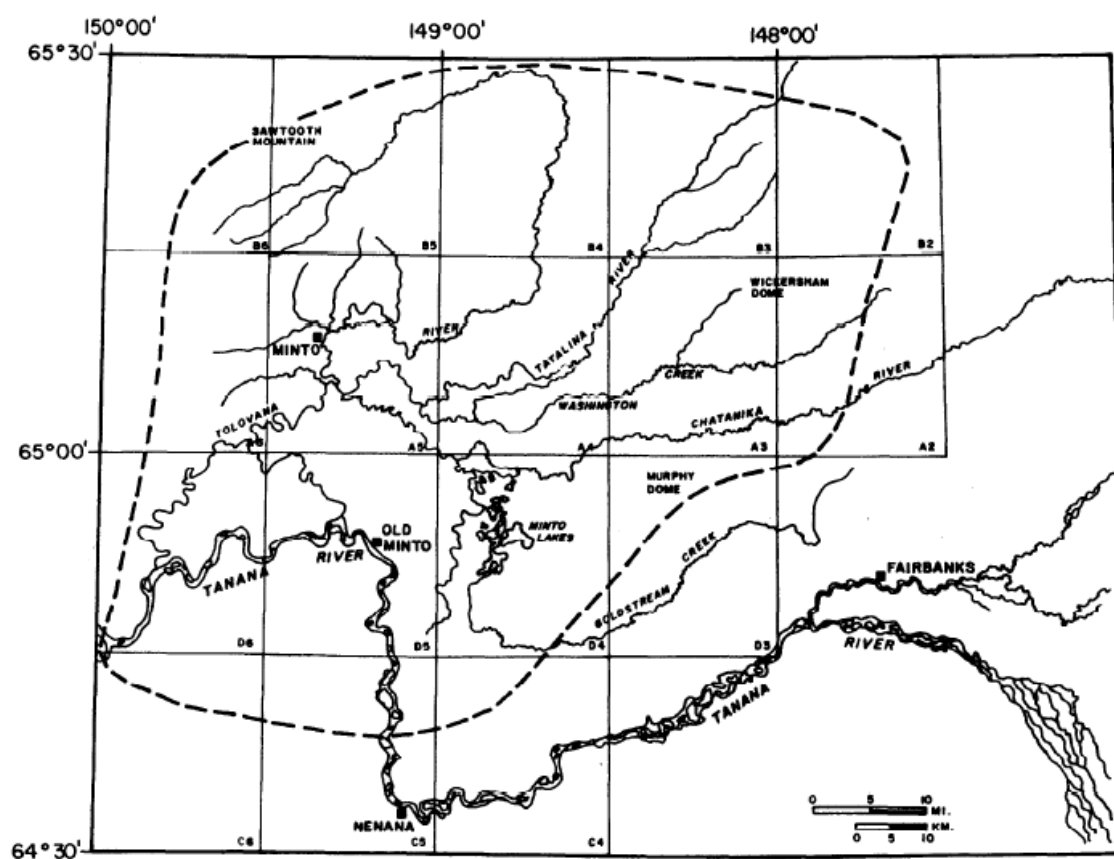
## 3.9 Figures



**Figure 3.1. Map of Minto and the Tanana Flats Area.** Location of Minto and the Minto Flats (shaded area) in relationship to Fairbanks and the Tanana and Yukon Rivers. From (Andrews 1988).



**Figure 3.2. Map of Minto Flats Moose-hunting Areas.** The cross-hatched portion represents moose-hunting areas as reported by Minto residents to the Alaska Department of Fish and Game (Andrews and Napoleon 1985). When asked, local residents suggest that this range actually extends much farther, up north to the Yukon and through the drainage to the east (See also Figure 3.3).



**Figure 3.3. Lower Tanana Land Use.** Historic range of land use by Minto Athabascans as compiled by ADF&G. From (Andrews 1988).

## FEDERAL LANDS AND INDIAN RESERVATIONS



**Figure 3.4. AK Federal Lands and Reservations** A patchwork of land ownership and management regimes serves to confound the Alaska Native’s ability to move across the landscape. Note this map only shows Federal Land holdings; state-owned-lands add a second layer of complication (Nationalatlas.gov 2003).



**Figure 3.5. Painted Sign at the Minto Boat Launch.** This sign hangs by the boat launch in New Minto.

Waste by non-residents continues however, as I've personally witnessed fish parts and entire fish with hooks in them floating in the shallow waters.



**Figure 3.6. Athabascan Fishwheel near Fort Yukon.** A fishwheel is a common method of fishing used by Athabascans. Two opposed baskets are turned by the flow of the river, and should a fish swim in to one, they will slide out into the holding area on the right as the basket lifts out of the water. The Minto band first started using these in 1903. (Picture taken in Fort Yukon, 2006).

### 3.10 REFERENCES

- ADHS. 2000. Healthy Alaskans 2010. Alaska Department of Health Services.
- AKDEC. 2006. Community Database Online. Juneau: Alaska Department of Commerce, Community and Economic Development.
- Anderson RC. 1998. Mid Course Correction: Toward a Sustainable Enterprise: The Interface Model. White River Junction: Chelsea Green Publishing Company. 207 p.
- Andre A, Fehr A. 2002. Gwich'in Ethnobotany: Plants Used by the Gwich'in for Food, Medicine, Shelter and Tools. . Inuvik, NWT: Gwich'in Social and Cultural Institute and Aurora Research, Inc. 68 p.
- Andrews EF. 1988. The Harvest of Fish and Wildlife for Subsistence Use by Residents of Minto, Ak. Juneau: Alaska Department of Fish and Game. 348 p.
- Andrews EF, Napoleon RK. 1985. Moose Hunting in the Minto Flats Management Area by Minto Permit Holders, 1984-85. Fairbanks: Alaska Department of Fish and Game. 23 p.
- ATSDR. 2001. Alaska Traditional Diet Project. [online] URL: <http://www.atsdr.cdc.gov/alaska/>.
- Bellisle F. 1998. Effects of Monosodium Glutamate on Human Food Palatability. . Annals of the New York Academy of Science 855:438-441.
1999. Glutamate and the Umami Taste: Sensory, Metabolic, Nutritional and Behavioral Considerations: A Review of the Literature Published in the Last 10 Years. Neuroscience Biobehavioral Review 1999(23):423-438.
- Blue Spruce B. 1962. The Amerindian. The American Indian Review:2.
- Bray GA, Nielsen SJ, Popkin BM. 2004. Consumption of High-Fructose Corn Syrup in Beverages May Play a Role in the Epidemic of Obesity. American Journal of Clinical Nutrition 79(4):537-543.
- Broussard BA, Johnson A, Jimes JH, Mary S, Fichtner R, Hauck F, Bachman-Carter K, Hayes J, Frohlich K, Gray N and others. 1991. Prevalence of Obesity in American Indians and Alaska Natives. American Journal of Clinical Nutrition 53:1535S-1542S.
- Brown LK, Mussell K. 1985. Introduction. In: Brown LK, Mussell K, editors. Ethnic and Regional Foodways in the United States: The Performance of Group Identity. Knoxville: the University of Tennessee Press.

- Bryant CA, Courtney A, Markesbery BA, DeWalt KM. 1985. *The Cultural Feast: An Introduction to Food and Society*. St. Paul: West Publishing Company.
- Case DS. 1984. *Alaska Natives and American Laws*. Fairbanks: University of Alaska Press.
- Caulfield R. 1983. *Subsistence Land Use in Upper Yukon Porcupine Communities, Alaska*. Dinjii Nats'aa Nan Kak Adagwaandaii. Report #16. Alaska Department of Fish and Game. 252 p.
2002. *Food Security in Arctic Alaska: A Preliminary Assessment*. In: Duhaime G, editor. *Sustainable Food Security in the Arctic*. Alberta: CCI Press.
- Doughty J. 1979. Commentary: Dangers of Reducing the Range of Food Choice in Developing Countries. *Ecology of Food and Nutrition* 8:275-283.
- Douglas M. 1979. *The World of Goods*. New York: W. W. Norton & Company. 228 p.
- Duhaime G, editor. 2002. *Sustainable Food Security in the Arctic*. Alberta: CCI Press.
- Egeland GM, Feyk LA, Middaugh JP. 1998. *Use of Traditional Foods in a Healthy Diet in Alaska: Risk Perspective*. Juneau: Alaska Division of Public Health.
- Fleener C, Thomas B. 2003. *Yukon Flats Salmon Traditional Knowledge*. Fort Yukon: Council of Athabascan Tribal Governments, Natural Resources Department. Report nr CATGNR 03-03. 36 p.
- Folke C, Colding J, Berkes F. 2003. *Building Resilience and Adaptive Capacity in Socio-Ecological Systems*. In: Berkes F, Colding J, Folke C, editors. *Navigating Socio-Ecological Systems*. Cambridge, UK: Cambridge University Press. p 352-387.
- Gerlach SC, Turner AM, Henry L, Loring P, Fleener C. in press. *Regional Foods, Food Systems, Security and Risk in Rural Alaska*. In: Duffy LK, Erickson K, editors. *Circumpolar Environmental Science: Current Issues in Resources, Health and Policy*. Fairbanks: University of Alaska Press.
- Gragson TL, Blount BG, editors. 1999. *Ethnoecology: Knowledge, Resources, and Rights*. Athens: The University of Georgia Press.
- Graves K. 2003. *Resilience and Adaptation among Alaska Native Men*. Fairbanks: University of Alaska Anchorage.
2004. *Resilience and Adaptation among Alaska Native Men: Abstract*. *International Journal of Circumpolar Health* 63(1):2004.

- Grivetti LE, Ogle BM. 2000. The Value of Traditional Foods in Meeting Macro- and Micronutrient Needs: The Wild Plant Connection. *Nutrition Research Reviews* 13:1-16.
- Hanover LM, White JS. 1993. Manufacturing, Composition and Applications of Fructose. *American Journal of Clinical Nutrition* 58:724S-732S.
- Heller CA, Scott EM. 1967. The Alaska Dietary Survey 1956-1961. Anchorage, AK: U.S. Department of Health, Education and Welfare.
- Holloway PS, Alexander G. 1990. Ethnobotany of the Fort Yukon Region, Alaska. *Economic Botany* 44:214-225
- Huntington HP. 1992. *Wildlife Management and Subsistence Hunting in Alaska*. Seattle, WA: University of Washington Press.
- Irvine KN, Kaplan S. 2001. Coping with Change: The Small Experiment as a Strategic Approach to Environmental Sustainability. *Environmental Management* 28(6):713-725.
- Juday G, Ott RA, Valentine DW, Barber VA. Forests, Climate Stress, Insects and Fire. In: Weller G, Anderson PA, editors; 1998 1997; Fairbanks. Center for Global Change and Arctic System Research.
- Kari PR. 1985. Upper Tanana Ethnobotany. *Alaska Historical Commission Studies in History* No. 182.
- Kloppenburg J, Hendrickson J, Stevenson GW. 1996. Coming into the Foodshed. *Agriculture and Human Values* 13(3):33-42.
- Krupa DJ. 1999. *Finding the Feather: Peter John and the Reverse Anthropology of the White Man Way*. Madison: University of Wisconsin, Madison. 315 p.
- Krupnik I, Jolly D, editors. 2002. *The Earth Is Faster Now: Indigenous Observations of Arctic Environmental Change*. Fairbanks: Arctic Research Consortium of the United States.
- Kuhnlein HV, Chan HM, Legge D, Barthet V. 2002. Macronutrient, Mineral and Fatty Acid Composition of Canadian Arctic Traditional Food. *Journal of Food Composition and Analysis* 15(5):545-566.
- Kuhnlein HV, Receveur O, Soueida R, Egeland GM. 2004. Arctic Indigenous Peoples Experience the Nutrition Transition with Changing Dietary Patterns and Obesity. *Journal of Nutrition* 134(6):1447-1453.
- Louv R. 2006. *Last Child in the Woods*. Chapel Hill: Algonquin Books.

- Marie-Francoise AMM, Siebelink E, de Graaf C, Van Staveren WA. 2001. Flavor Enhancement of Food Improves Dietary Intake and Nutritional Status of Elderly Nursing Home Residents. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 56:M200-M205.
- Mitchell DC. 2003. *Sold American*. Fairbanks, AK: University of Alaska Press.
- Nabhan GP. 2004. *Why Some Like It Hot: Food, Genes and Cultural Diversity*. Washington, D.C.: Island Press.
- Nabhan GP, Trimble S. 1994. *The Geography of Childhood*. Boston: Beacon Press.
- Nationalatlas.gov. 2003. *Alaska: Federal Lands and Indian Reservations*. Reston, VA: U.S. Department of the Interior, U.S. Geological Survey.
- Nobmann E, Byers T, Lanier AP, Hankin JH, Jackson MY. 1992. The Diet of Alaska Native Adults: 1987-1988. *American Journal of Clinical Nutrition* 55(5):1024-1032.
- Norris F. 2002. *Alaska Subsistence*. Anchorage: U.S. Department of the Interior, National Park Service.
- Nuttall M. 2001. Indigenous Peoples and Climate Change Research in the Arctic. *Indigenous Affairs* 4:377-410.
- Olson WM. 1968. *Minto, Alaska: Cultural and Historical Influences on Group Identity*. College, AK: University of Alaska.
1981. *Minto, Alaska*. In: Sturtevant WC, editor. *Handbook of North American Indians*. Washington: Smithsonian Institution Press.
- Pollan M. 2006. *The Omnivore's Dilemma: A Natural History of Four Meals*. New York: The Penguin Press.
- Reed LJ. 1995. *Diet and Subsistence in Transition: Traditional and Western Practices in an Alaskan Athapaskan Village*. University of Oregon. 265 p.
- Shepherd PE. 1987. *Relationship of Environmental Change to the Minto Flats Subsistence Resource Base*. Anchorage: United States Department of the Interior, Bureau of Land Management. 34 p.
- Slaby DL. 1981. *Demography of an Athabascan Village: Minto, Alaska*. Fairbanks: University of Alaska Fairbanks.
- Sundkvist A, Milestad R, Jansson A. 2005. On the Importance of Tightening Feedback Loops for Sustainable Development of Food Systems. *Food Policy* 30:224-239.

- Thorburn AW, Brand JC, Truswell AS. 1987. Slowly Digested and Absorbed Carbohydrate in Traditional Bushfoods: A Protective Factor against Diabetes? *American Journal of Clinical Nutrition* 45(1):98-106.
- Troger S. 2002. Transformation of Food Systems in the Context of Political Change. 'World Interpretations' and Their Impact on Nutrition in South-West Tanzania. *Die Erde* 133(4):379-399.
- Village Council M. 1983. Minto: People of the Lakes. Minto: Minto Village Council.
- Wilk R, editor. 2006. Fast Food / Slow Food: The Cultural Economy of the Global Food System. Lanham: AltaMira Press.
- Zandstra E, Graaf C. 1998. Sensory Perception and Pleasantness of Orange Beverages from Childhood to Old Age. *Food Quality preference* 35:7-12.

## CONCLUSION

“We have it within our deepest powers not only to change our ‘selves’ but to change our culture. If man is to remain on earth he must transform the five-millenia-long urbanizing civilization tradition into a new ecologically sensitive harmony-oriented wild-minded scientific-spiritual culture. ‘Wilderness is the state of complete awareness. That’s why we need it.’” (Snyder 1969:174-175)

With these papers included here I have explored some very complicated dimensions of change: how and why people change, how they actively use change to benefit their lives, and how those changes relate to the preservation and respect of tradition and identity. People like Patrick Smith in Minto take control every day over the forms that change takes in their communities and environments, even when confronted with drivers of change that are outside of their immediate control. Rapid, unanticipated and unprecedented change is happening in Alaska, and they continue to strive to the best of their abilities to remain, in their words, self-reliant and in charge of change, rather than at the mercy of it. I first travelled to Minto to explore but one change: a new, locally initiated community garden. Yet from our collaboration, an intimate sharing of stories, meals, concerns and expertise, an entire perspective on change emerged that is relevant not only to this and other rural communities in Alaska, but to people world-wide. And I found that my role there was not just to describe, catalog or interpret the changes in their lives, but to support and facilitate their initiatives as they wanted, through dialogue, collaboration and research.

Long-term social-ecological sustainability is only possible when the people of that society are able to manage change: to innovate, think outside of their cultural or traditional ‘boxes,’ and to find, in the face of adversity and surprise, vision enough to walk away from those things in their lives that are not working to transform themselves into something new – perhaps something healthier, more adaptive, resilient, efficient, more ecologically concomitant, or in a word, something more ‘elegant’ (Jackson 1980; Loring 2007; Quinn 1999; 2006; Snyder 1969; Weisman 1999). The communities discussed here, and indeed all Alaska Native communities are cases with histories illustrative of this proposition: they have lived effectively on the Alaskan landscape for millenia because they made a tradition of innovation and change. Within just the last 200 years Alaska Native communities have seen Russian and American colonization, Japanese invasion, isolation camps, famine caused by foreign overharvesting of wildlife, missionaries and missionary schools, rural agricultural development programs, the imposition of state and federal wildlife management regimes, a gold rush, land rush and now an oil rush and global warming. Through these same years they have transformed themselves significantly, from living in small groups with a highly-mobile lifestyle, to settlement in more permanent communities; they effectively combine and maintain traditions of the hunt with a cash economy and agricultural practices. Yet though many of the objects and habits of their lives have changed or disappeared, from canoes to motorboats, arrows to bullets, hand-axes to chainsaws, and dog-teams to snow-machines, Alaska Natives remain a distinct, vibrant, and diverse community of peoples. They celebrate their cultures through local gatherings, potlatches, community feasts and large-

scale events like the World Eskimo-Indian Olympics, fight for their environmental and cultural integrity openly and effectively at forums such as the Alaska Forum on the Environment, and actively engage the contemporary political dialogue at state, federal, and international levels.

Of their many contemporary challenges, those with the most significant and troubling long-term implications are therefore not the ones outside the immediate reach of human innovation and adaptation such as the downscale impacts of global climatic and ecological change, but the ‘man-made’ ones. The state and federal regulatory frameworks I have described throughout these chapters construct ‘tradition’ in very different, temporally static terms. They confine Alaska Natives’ land access and wildlife harvest activities and to a historically established set of patterns and strategies which are derived from our perceptions and fragmented knowledge of their history. They do not by any means capture the realities of life in rural Alaska, now or in the past, where people meet challenges with experimentation and innovation.

Subjected by resource management regimes to a barely-navigable geographic patchwork of private, state, and federally owned land, and to a calendar of hunting seasons based on secular, incomplete and inaccurate information about wildlife abundances and migrations, Alaska Natives are no longer free to modify their land-use patterns in this ad-hoc and experimental manner. Without this license, and given that global climate change will continue to have unanticipated downscale impacts upon seasonality and weather, both the short- and long-term viability of the country food harvest as a primary source of livelihood is questionable at best. As such, store-bought

foods will continue to play an increasing role in local diets. Once, like the outpost gardens, store-bought foods contributed in healthy ways to viable Alaska Native lifestyles, playing small, complementary roles in a diversified economy and bolstering overall food security. But as I have shown here, their increasing role of commercial foods as a substitute for wild, country foods has in recent years gone far towards decreasing Alaska Native communities' health and self-reliance, and has increased their exposure to a wide variety of ecological, economic and political risks.

There is no one correct solution to contemporary challenges like these, nor can solutions come via mandate as has been attempted in the past. These globally-scaled challenges are, however, far less intractable from a local perspective than many believe (Huntington and others 2006; Irvine and Kaplan 2001). If enabled with the freedom and opportunity to experiment and innovate, no one is better equipped to find the solutions that best meet local needs than the people living in rural communities like Fort Yukon and Minto themselves (Gupta 2001; Irvine and Kaplan 2001; Von Braun and Virchow 2001). Where and when they deem necessary such community-based experiments do, however, need to be able to call upon the high-quality information a University scientist can provide or the project management expertise of a well-funded wildlife conservation organization. But such collaboration is only possible and fruitful with the support of political, economic and social institutions that are willing to take their direction from locally-founded movements to develop adaptive capacity, rebuild self-reliance and craft local definitions of self-reliance, sovereignty and control (Berkes 2005; Kottak 1990). Researchers, NGOs and other institutions must be willing to take direction and play the

roles of facilitator and supporter, rather than the familiar role of expert problem solver; otherwise the significant and varied challenges discussed here will not be met without continued destruction of Alaska's diverse cultural landscape. Indeed if we make this possible, by according Alaska Natives the freedom to innovate and by structuring our cooperation with them in a way that confronts needs and challenges as they are perceived and defined by the communities themselves, long-term, sustainable solutions are far more likely to emerge (Weisman 1999). Future researchers should take note, and pursue projects that target needs as they are identified by the communities and researchers via collaboration and cooperation, in order to develop solutions that are more relevant, meaningful and effective that we have been able to accomplish so far.

## REFERENCES

- Berkes F. 2005. The Scientist as Facilitator or Adaptive Co-Manager? *The Common Property Resource Digest* 75:4-5.
- Gupta A. 2001. Grassroots Movements. In: Virchow D, Von Braun J, editors. *Villages in the Future: Crops, Jobs and Livelihood*. New York: Springer.
- Huntington HP, Boyle M, Flowers GE, Weatherly JW, Hamilton LC, Hinzman LD, Gerlach SC, Zulueta R, Nicolson C, Overpeck JT. 2006. The Influence of Human Activity in the Arctic on Climate and Climate Impacts. *Climatic Change* 81(3).
- Irvine KN, Kaplan S. 2001. Coping with Change: The Small Experiment as a Strategic Approach to Environmental Sustainability. *Environmental Management* 28(6):713-725.
- Jackson W. 1980. *New Roots for Agriculture*. San Francisco, CA: Friends of the Earth.
- Kottak CP. 1990. Culture And "Economic Development". *American Anthropologist* 92(3):723-732.
- Loring P. 2007. The Most Resilient Show on Earth: The Circus as a Model for Viewing Identity, Change and Chaos. *Ecology and Society* 12(1):9.

Quinn D. 1999. *Beyond Civilization: Humanity's Next Great Adventure*. New York, NY: Hanmony Books. 202 p.

2006. *The New Renaissance. If They Give You Lined Paper, Write Sideways*. Hanover, NH: Steerforth Press.

Snyder G. 1969. *Four Changes*. Turtle Island. Boston: Shambhala. p 208.

Von Braun J, Virchow D. 2001. *Village Futures: Concept, Overview and Policy Implications*. In: Virchow D, Von Braun J, editors. *Villages in the Future: Crops, Jobs and Livelihood*. New York: Springer.

Weisman A. 1999. *Gaviotas: A Village to Reinvent the World*. White River Junction: Chelsea Green Publishing Company. 280 p.

## APPENDIX A

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## **APPENDIX B**

### **CD INFORMATION: Garden Records for Villages of the Yukon Circle, XLS and JPG Format**

The compact disc included with this thesis contains one (1) .XLS spreadsheet created in Microsoft® Excel 2003 and 299 scanned .JPG documents created using Runningman Software's Digital File Cabinet (DFC). A summary of the data found in the scanned images is in the spreadsheet. Scanned images are organized as they were found at the US National Archives, Anchorage Alaska Office, with summary and citation information in text file format where available. Images are also included unsorted in the subdirectory "Unsorted." For more information about DFC and Runningman Software, visit <http://www.rmsft.com/> .